Gouvernement du Canada
Ministère des Communications

Government of Canada
Department of Communications

Le Centre canadien de recherche sur l'informatisation du travail
Canadian Workplace Automation Research Centre

Canada

Communications Canada
Canadian Workplace Automation Research Centre
Organizational Research Directorate

OFFICE AUTOMATION AND PRODUCTIVITY

REVIEW OF THE LITERATURE

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September 1986
Laval

CC-CWARC-DLR-86/7-006

This document is part of a series of research reports resulting from work carried out for or by the Organizational Research Directorate of the Canadian Workplace Automation Research Centre, Communications Canada. The authors accept full responsibility for the content.

The document was originally written in French, and was translated into English by the Translation Bureau, Department of the Secretary of State of Canada.

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Cat. No. Co28-1/10-1988E

ISBN 0-662-16252-8
(Original version: 0-662-94940-4, CCRIT, Laval)

Ce document est également disponible en français.

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INTRODUCTION

The Canadian Workplace Automation Research Centre was set up by the federal government with a view to strengthening Canada's position in the area of workplace automation and to act as a catalyst for research efforts in this important sector. The Centre is thus working towards a leadership role in applied research in the field of automated office systems by ensuring that these systems contribute to the productivity of organizations in the public and private sectors. Its goal is to achieve a synthesis of user needs and contribute to solving problems of office automation.

Organizational productivity and performance is one aspect of the field of organizational research.

In this specific area, priority is given to the assessment and eventual development of tools for measuring performance, in particular in the area of "non-structured" office work. Another priority is learning how to better measure the performance of organizations seen as systems.

In working toward these goals, the Organizational Research Branch selected five research sub-goals:

1. Inventory the needs of public and private users (perceived and measured objectively) in terms of productivity (performance, effectiveness, efficiency) by meeting the various client groups (organizations, unions and others) on their own territory.

2. Determine the state of knowledge in the field and select the best models and measurement tools, the best schools of thought and research.

3. Refine and combine instruments for analysing macroeconomic and technological trends.

4. Participate in public and private implementation projects to test and/or transfer the tools thus developed or improved.

5. Generate high-calibre specialized expertise in this field and transfer it to Canadian businesses or government agencies (transfer of persons and/or knowledge).

To achieve the second sub-goal, we felt it was necessary to bring together as exhaustive a bibliography as possible on the subject of productivity in the office environment. This document is updated monthly and contains titles from both the underground literature and those available through more traditional systems. The next step was to make a critical review of the literature. Each document felt to be significant and to contribute to our field of study was read, analysed and abstracted by a team of research trainees during 1986. This document is the product of that work.

In addition to the abstracts, it contains an original index of references which includes definitions or usage for the terms as well as the articles to which they refer.

A report entitled "Office Automation and Productivity: a Status Report" is published together with this document; it describes the current state of knowledge on productivity measurement and describes the models and schools of thought to this area of research.

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ABSTRACTS

AIRT 821 **Airhart, Truett E., "Productivity and the Knowledge Worker," Journal of Micrographics, Vol. 15, No. 8, August 1982, pp. 24-33.**

Productivity is the main concern of this article, and more specifically the productivity of the knowledge worker.

For Airhart, improving productivity among office workers should result, all other things being equal, in a change in national productivity. There is no indication, however, that this trend will materialize. The factors mentioned in this text to explain the decline in productivity are military spending, costs related to the environment, etc.

The author divides white-collar workers into two groups: support workers who, in general, perform repetitive tasks, and knowledge workers, who mainly analyse and make decisions. In the latter case in particular, knowledge plays a resource role in the same way as capital investment and human and financial resources do.

Airhart considers that the potential for increasing the productivity of knowledge workers will grow during the 1980s, principally due to three factors: reductions in equipment (hardware) costs, greater availability of information because of existing sources, and the implementation of new techniques. The first step towards increasing this productivity probably lies in revising the standards that apply to measurement of the concept. Until quite recently, office productivity was measured using criteria and techniques developed in industry.

The author also considers that convergent technologies, such as electronic mail, which combines telephone, telegraph and word processing, and teleconferencing, can assist the knowledge worker in manipulating vast quantities of information and thus furnish better performance.

Key words: productivity, knowledge worker, white-collar worker, information, implementation, technology.

ALTS 761 Alter, Steven L., "How Effective Managers Use Information Systems," Harvard Business Review, Vol. 54, No. 6, November/December 1976, pp. 97-104.

Managers too often have little say in the development of decision-support systems. Alter suggests that designers and managers cooperate in order to derive maximum benefit from the capacities of new technologies.

The author defines information systems in terms of their use or function, as follows:

1. data retrieval,
2. mechanisms for analysing data files,
3. obtaining aggregations in the form of standard reports (this function is the one most often encountered),
4. estimating the consequences of proposed decisions,
5. proposing decisions,
6. decision-making.

Next, the author presents seven types of systems and describes each using an example. These various types of systems show the diversity of approaches, whether data-oriented or oriented toward decision-support models. Some provide the appropriate information, while others, such as those that are more analysis-oriented, assist managers in organizing information and in formulating assessments of proposed decisions. But what would motivate managers to acquire such decision-support systems? Based on the results of a study conducted by Alter, there is a wide variety of incentives for introducing such systems, for example:

1. improving interpersonal communication,
2. simplified problem solving,
3. increasing organizational control,
4. encouraging individual development.

The author then deals with the strategy to follow, if required, to encourage managers within the organization to become involved and participate in the development of decision-support systems:

1. the idea of a new system must be imposed gradually,
2. employees are then introduced to a training program to teach them how to use the system,
3. prototypes are used in order to modify the system if required.

The development of a decision-support system takes on its full meaning when it becomes apparent that the organization is in need of a fundamental change in the way its decisions are made and implemented. This is why it is important to promote awareness of the possibilities and the challenges to be met in this field.

Key words: information system, decision-support system, implementation strategy.

AMEP 821 American Productivity Center, White-collar Productivity: the National Challenge, Sponsored by Steelcase Inc., Houston: 1982.

This working paper deals with the American Productivity Center (APC) study on white-collar productivity.

In view of the growth of the service and communications sectors, the authors look at a recent national problem: the effectiveness of white-collar workers. Since many of their tasks are intangible, it is difficult to observe or evaluate them. It appears from the outset that, according to the authors, the significant increase in productivity seems to be due to technology rather than to improved work methods. This was a timely and important study, which yielded the following main conclusions:

1. American industry could save over $100 billion by large-scale implementation of programs to improve work productivity.

2. Despite growing interest, little has been done in the area of productivity. This is due to a lack of information on how to organize improvement efforts and a lack of data, valid measurement tools and tested models.

3. Thirty per cent of respondents said they hoped to add value to their product or service through implementation of productivity improvement programs.

4. For the period 1979-1981, companies with productivity improvement programs reported average gains of 9.5%.

5. Benefits are real, and dollars spent on these programs are cost-effective.

6. Office workers are very interested in being more productive, provided management gives them the necessary tools, salaries that take this increased productivity into account and good leadership.

7. More often than not, activities that improve productivity emerge by accident. Formal guides or corporate strategies are said to be rare or nonexistent.

8. Productivity programs lead to increased interaction between human resources development, office automation systems and "environmental design."

9. Measuring the productivity effort is the most complex and troubling problem for all companies. The lack of sophisticated measurement tools prevented companies from improving productivity, while those companies that went ahead without reasonable measuring methods found that they could not demonstrate that the changes accomplished were the result of their efforts.

10. Most managers approve of productivity improvement goals, but are not very clear about how this area should be developed.

11. Almost all internal information came from experts, in particular professionals, and not from those directly affected by the change.

Key words: APC, productivity, white-collar workers, effectiveness, case study, Steelcase Inc.

ARDP 851 Ardouin, Pierre, Productivity Models and Measurement in Office Automation, Laval, Quebec: Canadian Workplace Automation Research Centre (CWARC), 1985

This working analyses the methods, methodologies and approaches for the measurement and modelling of productivity in office automation. It is the preliminary version of a report[1] based on a study of the characteristics of organizational productivity as related to computers, including traditional automated systems, management information systems and office systems.

The methodology included a review of the literature and an analysis of the results of related research projects, some of which were carried out by the federal government. This document also contains a reference bibliography of texts relevant to the project.

The document describes several approaches of interest for productivity modelling or measurement:

1. procedural activities (T. Grusec),
2. present value (R. Engel and M. Townsend),
3. detailed analysis (CECIT and Hickling Partners),
4. in-depth analysis (R. Faulkner),
5. baseline measures (OCRA Communications).

Key words: productivity, productivity measurement, office automation.

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[1] A final report on this study, entitled Critical Analysis of Productivity Models and Measurement in Information Processing, was published by CWARC in 1986.

ARDP 861 **Ardouin, Pierre,** **Planification et productivité d'usagers de l'informatique dans de grandes organisations de la région de Montréal**, **Laval, Quebec: Canadian Workplace Automation Research Centre (CWARC), 1986.**

This document presents the results of a survey in early 1986 of some 50 large and medium-sized companies in the Montreal area. The objectives of this survey were to determine the mechanisms used by these organizations in planning and measuring the productivity of users of various information technologies, including office systems. Through meetings and the questionnaires annexed to the text, the author collected opinions from managers on matters pertaining to productivity measurement.

Ardouin first describes the procedure followed in his study and explains how the sample used was selected. Next, he deals with the question of planning information processing and the various productivity measures. The text concludes with the results of the study and the opinions of respondents on the various aspects of measurement, including the usefulness of measuring human impact and user roles.

This was a preliminary report; the final report, entitled Study of Information Processing Planning and Productivity in 56 Large Organizations, was issued in April 1986.

key words: productivity, planning, productivity measurement, information processing, office automation, case study.

BAID 821 Bain, David, *The Productivity Prescription: the Manager's Guide to Improving Productivity and Profits*. McGraw-Hill, 1982.

Part III of Bain's book contains three chapters (5, 6, and 7) and deals with productivity measurement.

Chapter 5

Chapter 5 covers the development of an appropriate productivity measure. In the author's view, this measure may be defined in terms of various ratios:

$$\begin{aligned}\text{productivity} &= \frac{\text{total outputs}}{\text{total inputs}} = \frac{\text{total results achieved}}{\text{total resources used}}\\ &= \frac{\text{effectiveness with which organizational goals are achieved}}{\text{efficiency with which resources are consumed}}\\ &= \frac{\text{output}}{\text{hours used to obtain output}}\\ &= \frac{\text{output}}{\text{hour}}\end{aligned}$$

The need to measure and improve productivity is felt in almost all tasks carried out in most organizations. Comparison between past and present productivity levels for various activities within the organization is a key step in achieving productivity improvement. This increase thus depends on a meaningful and complete measure applied to a wide range of activities in the organization. There are, however, a number of obstacles to the implementation of a productivity measure, including the complexity of the work process, reluctance to provide the required resources, etc. These resources and the total participation of management are at the base of the organization's potential for attaining the goals set as managerial awareness grows.

Chapter 6

Chapter 6 deals with the design and verification of measures. While the measure generally represents the biggest obstacle to quantifying productivity, there are a number of tools that may be effective in designing systems for measuring productivity. The basis of the manager's expertise is in the preparation of standards and budgets for work to be carried out. Performance standards should be based on other factors than past performance because this previous performance contains inefficiencies and does not consider the organization's performance potential.

Managerial performance is assessed through comparison of current results with forecasts. According to Bain, the variability of these results may be classified in terms of variations in price or quantity. Quantity is related to the effective use of consumption, while prices are linked to wages and materials. In general, the variability of quantities is much more influenced by managerial action than by variations in price. While price variations are not completely controllable, they remain a managerial responsibility and must be measured and reported just like quantity variations. It is only by including both price and quantity in the measurement system that we may accurately gauge the organization's progress and detect any problems. Ideally, these methods should be reviewed and checked so they can be corrected in cases of resource waste. Development of labor standards is the main purpose of these methods. In most cases, this involves defining work sampling procedures and drawing up tables along with efficiency percentages.

Chapter 7

The last chapter of interest to us discusses qualitative considerations. Quality is synonymous with customer satisfaction, and this satisfaction depends on the organization and its response to customer needs. Technological change and the increasing complexity of products and services result in the organization's being squeezed between rising costs, customer resistance to price increases and quality. For management to be successful in today's operating environment, it must continually strive to find and maintain the balance between these three factors, so as to increase the organization's market share, satisfy customers and increase profits.

Quality measures are linked to the effectiveness with which the organization produces output that corresponds to the specific requirements of customers. These quality characteristics are the basis for determining what should be measured. The effectiveness with which output quality is achieved determines customer satisfaction.

Key words: productivity, measurement problems, measurement systems, performance assessment, quality, performance standards, costs related to quality, quality measures, quality program, evaluation criteria (for productivity programs), criteria for a meaningful measurement system.

BAIJ 791 Bair, James, Productivity Assessment of Office Automation Systems. Vol. I: Office Automation Results. Final report prepared for Nat'l. Arch. & Rec. Serv., ORM, SRI International, 03, 1979.

This volume, prepared by the U.S. government, presents the results of research based on seven years of observation of 25 laboratories. The author claims that this volume provides the first detailed description of office automation, that is, what is really happening in the field and not the point of view of designers and manufacturers.

Implementation of office automation yields five types of results. There are several differences between these various results, the most significant having to do with tangibility or the ease with which results can be demonstrated. The author then develops and explains each of these results:

1. Substitution of procedures -- results of this type occur when an office automation tool replaces a manual procedure (for example, word processing).

2. Acceleration of procedures -- these results are the consequence of changes in the processing, flow and availability of information (for example, messages sent by electronic mail).

3. Temporal results -- these results come from the ability to perform activities at various times of the day or week, and at different locations; they affect such things as working hours and means of communication.

4. Control results -- office automation allows the organization to increase its ability to monitor its performance and thus become more viable. Control depends on the information possessed and thus the higher the speed and quality of information, the better the control.

5. Qualitative results -- this type of change, while hard to measure, is observable in two main areas, quality of working life and the quality of the organization's products.

All the organizational results thus observed have the potential to transform organizations; to make them, in the author's terms, more direct (on-line). For example, based on the results described in this article, it may be seen that management is evolving and becoming more accessible, both vertically and horizontally. Basically, organizations are experiencing an increase in interconnections between their members.

Bair also notes that organizational development programs might have yielded just as much benefit as what from office automation and at lower cost if it had not been for the resistance to change displayed by many office workers. Well-planned implementation, however, can provide support for organizational development and assist in the transition to an automated system.

Key words: office automation, implementation, resistance, results of implementation.

BAIJ 801 **Bair, James H., "An Analysis of Organizational Productivity and the Use of Electronic Office Systems,"** Proceedings of the 43rd American Society for Information Science, Vol. 17, 1980, pp. 4-9.

This article describes some obstacles to the measuring and improvement of productivity through the use of electronic office systems (EOS). Office technology is deemed to have "succeeded" when it replaces certain forms of manual communication and manipulation. Initially, the results of using office systems must be based on a number of variables , including:

1. implementation strategy,
2. interface friendliness,
3. training and user support,
4. computer resources,
5. management goals,
6. criteria for organizational performance.

We may nevertheless ask whether changes brought about by the use of office systems have an impact on productivity: some authors speak of the return on investment in technology and training. The difficulty in defining output in the case of white-collar workers is quite clear. Bair considers that the comparison of labor/time for on-going office processes before and after EOS implementation gives a reasonable measure of productivity changes. As well, he believes in the need to increase efficiency and effectiveness before envisaging an improvement in productivity. The mere substitution of EOS for the conventional activity does not guarantee productivity increase; such criteria as proof of improved efficiency following implementation are required to attain this goal.

Bair reports that the two primary goals of any study of office automation are to determine the acceptance level of EOS-based office innovations and to identify opportunities for EOS-based improvements. It is also important that changes due to implementation of office systems be considered an integral part of the social and technical system of the organization.

Key words: productivity, office automation, productivity measurement, efficiency, effectiveness, improvement opportunities.

BAIJ 831 **Bair, James H.,"The Interface to Human-Computers Productivity in Office Systems". Papers from the 4th Office Automation Conference, Philadelphia, February 21-23, 1983. American Federation of Information Processing Societies. Office Automation Conference Digest. Washington: AFIPS Press. pp. 113-114.**

This article deals with a very popular topic: ergonomics. The intensive use of computers in the office requires a fresh perspective of the relationship between the person and the machine. The main tenets of this perspective are:

1. user motivation,
2. user satisfaction.

The research for a cause-and-effect relationship between motivation and satisfaction does not show a correlation. Knowledge workers, in particular, can be motivated without necessarily being satisfied.

Bair next explains "how" the use of integrated office systems (IOS) may be motivating and satisfying. Indeed, in the future, all offices will use IOS with the of increasing productivity and effectiveness. The author proposes two approaches by which IOS can achieve motivation and satisfaction:

1. personalized relationship with adequate resources,
2. personal, individualized tools.

Productivity is a crucial factor in the continued development of IOS technology. Although IOS development is inevitable, improved productivity is not; however, with careful attention to the technological systems from a humanistic perspective, we can increase productivity and enhance individual satisfaction.

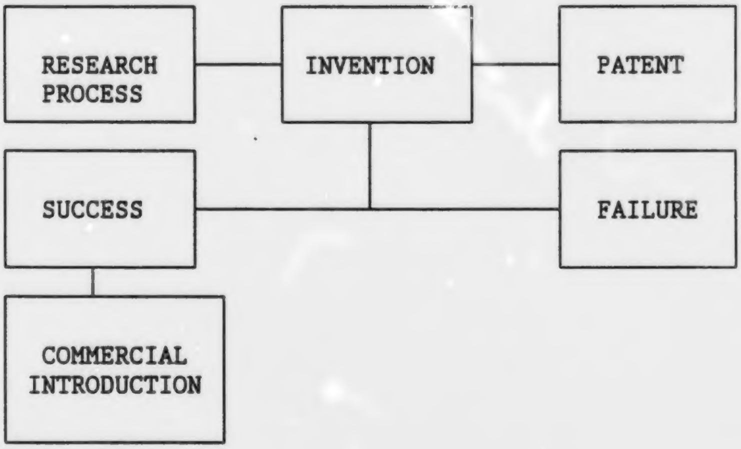
Key words: ergonomics, productivity, IOS.

BAIM 851 Baily, Martin Neil and Alok K. Chakrabarti, "Innovation and Productivity in US Industry," Brookings Papers on Economic Activity 2, Washington, D.C.: The Brookings Institution, 1985, pp. 609-639.

In this article, the authors present the role of innovation in the growth and development of productivity. Using two case studies, they show that the slowdown in innovation played an important part in the decline of growth in productivity.

The article is divided into three sections:

a) attempts at and potential for progress --



b) the innovation process -- the authors first present the various reasons for wanting to innovate, then the availability of new technology, the role of new products, and lastly the role of information as a means for improving and assessing productivity growth;

c) information collection and its role in assessing the impact of the innovation on productivity.

For the two case studies, the authors chose one company in the chemical industry and one in the textile industry.

Key words: innovation, productivity, information, progress, case study, chemical industry, textile industry.

BAKD 821 **Bakken, David and Alan L. Bernstein. "A Systematic Approach to Evaluation," Training & Development Journal, Vol. 36, No. 8, August 1982, pp. 44-51.**

This text describes a systematic approach to training evaluation. The method requires that three elements be identified:

1. decision-makers and their requirements for information on the effectiveness of a given training program; the decisions that could be made are grouped into two categories -- training function decisions, and management decisions;

2. goals of the training program;

3. observable results that satisfy decision-makers' requirements and supervision of training goals.

There are five general training goals:

1. learner reaction,
2. knowledge,
3. job performance,
4. organization,
5. ultimate goal.

These goals translate into:

1. personal growth,
2. acquisition of knowledge,
3. acquisition of skill or improved performance,
4. organizational development.

Four types of results are possible:

1. employee reactions,
2. knowledge,
3. performance,
4. measurement of organizational characteristics.

Two characteristics should also be included when developing evaluation tools: reliability and validity. The primary requirement in evaluation is determining what to measure and how to measure it. The last point covered is calculating the impact of training. This is done by analysing before-and-after comparisons or by time-series analysis.

Key words: training, systematic approach, training objectives, impact of training.

BANN 851 **Bancroft, Nancy, Neil Perli and Barnie Sontag.** "Productivity Improvement in the Office at Digital Equipment Corporation," National Productivity Review, Vol. 41, No. 1, Autumn 1981, pp. 53-59.

This article describes an office systems consulting methodology (OSC) designed to improve the productivity of an "office." The method is described using the example of Digital Equipment Corporation (DEC). introduced a "user-oriented" approach to implement office systems in its purchasing department. Employees were given the opportunity to choose the appropriate technology as well as options for organizational change. The goals of this method were to:

1. develop an implementation method to improve productivity,
2. examine and measure productivity,
3. provide R&D support for new products.

The office systems consulting methodology was developed by Office Systems Program Group (OSP) and covered five stages:

1. data collection,
2. data analysis,
3. design of future systems,
4. evaluation and choice of organizational and technological alternatives,
5. implementation and evaluation of planning, in consultation with employees.

Implementing office systems in the purchasing department using this method resulted in:

1. lower acquisition costs,
2. better-quality service,
3. improved relations with suppliers,
4. greater job satisfaction,
5. improved communication,
6. increased productivity,
7. better morale,
8. personal involvement of employees.

Key words: productivity, improvement method, OSC, implementation, office automation, organizational change.

BIKT 831 Bikson, T.K. and B.A. Gutek. Advanced Office Systems: an Empirical Look at Utilization and Satisfaction. The Rand Corporation, N-1970-NSF, 1983.

An excellent article containing empirical data and interesting ideas on office systems performance measurement and presenting the preliminary results of a study on advanced office systems in varied user contexts. In pursuing their objective of identifying factors affecting how information technology was integrated into white-collar work, the authors sought the cooperation of 26 different organizations (for a total of 530 employees). Bikson and Gutek note, however, that this sample is not representative, since it only includes those organizations that have adopted this technology. The information collected yielded the following results:

1. White-collar offices can be classified into four types: management and administration, data-oriented professional, text-oriented professional and support staff.
2. White-collar work forms systematic clusters of information handling activities, some of which are performed by nearly everyone in an organization.
3. A large percentage of employees, including senior managers and professionals, already use computers in their work and most non-users expect to do so in the future.
4. Four aspects of computer systems underlie user satisfaction: functionality, equipment performance, interaction features and office environment.
5. Among these, satisfaction with functionality is the best predictor of use of the system. Functionality combined with an adequate environment forms the best situation for overall satisfaction related to new technology.
6. The most important organizational influences on use of and satisfaction with information technology are variety in work and the organization's approach to technological change.

A major incentive to invest in office systems is the expectation of improved productivity or reduced labor costs. Most employees feel that use of a computer has a favorable effect on quality and productivity. It should be borne in mind that job satisfaction is a necessary but not sufficient condition for increased productivity. The authors note, in conclusion, that organizational characteristics appear just as important as

the computer in determining what will come after the implementation of office systems. They also mention the limits of their study and the need for further research in this field.

Key words: performance measures, office systems, white-collar workers, information processing, productivity, job satisfaction, case study.

BOWW 861 **Bowen, William. "The Puny Payoff from Office Computers," Fortune, May 26, 1986, pp. 20-24.**

White-collar productivity has not changed, despite the billions of dollars spent on new technology, claims author William Bowen, who has no quarrel with the contribution of new technology to office work. But, quoting a number of authors and presenting the experience of several organizations, he quickly demonstrates that the strategies employed in adopting new technology play a determining role in attaining objectives, in particular improved productivity.

Among the various obstacles to achieving these goals, the author mentions the problem in terms of time as explained by M. N. Baily: "The puzzling thing is that the computer revolution has not yet paid off in productivity growth as did the earlier generations of innovation." To this must be added the process of organizing work.

Studies by S.S. Roach and Morgan Stanley have shown that white-collar productivity is still at the same level as in 1960. This explains the growing dissatisfaction that characterizes expectations about new technology.

Down Escalator Factors may, to a certain extent, explain the failure of computers to improve productivity. An example given is the concern with minimizing the costs of computerization, particularly in terms of support jobs, considered as non-productive.

These factors may also be explained by what economist H. Leibenstein terms "X-inefficiency," the inefficiency resulting from non-rational use of resources.

Nancy Bancroft of Digital Equipment Corporation suggests a change in work methods in addition to examining procedures prior to purchasing equipment. Paul Strassman advises automating only after procedures have been simplified.

The quotations and experience of a number of firms indicate that automation alone will not solve problems: changes should be organized and planned before introducing information technology.

Key words: productivity, Down Escalator Factors, inefficiency.

BRIC 831 **Brisley, Chester L. and William F. Fielder Jr., "'Unmeasurable' Output of Knowledge/Office Worker's Can and Must be Measured,"** Industrial Engineering, Vol. 15, No. 7, July 1983, pp. 42-47.

Knowledge work is an ever-increasing category of employment that includes:

1. managers,
2. supervisors,
3. executives,
4. other professionals.

These people make up the human-capital resource that makes an information-intensive economy viable. Knowledge work must be measured, because it is a factor in the rapid rise of costs (12-15% annually). As well, if this work is not measured, how can it be managed? A number of authors are cited in this article, which establishes a nomenclature of methods used in measuring knowledge work. Among those mentioned are Mundel's principles, OFA (Operation Function Analysis) and EOA (Engineering Operation Analysis). The techniques discussed are:

1. work sampling,
2. multiple regression,
3. linear programming,

The four key elements in analysing operations and measuring improvements in the productivity of knowledge workers are:

1. demand orientation,
2. interorganizational focus,
3. creativity,
4. "do-it-yourself" orientation.

These are illustrated using an example of knowledge work measurement at Hughes Aircraft Co., measuring coordination of projects managed by engineers. As a result, coordination was:

1. more effective,
2. more efficient,
3. more productive.

This measure may be used to improve administration and, as a consequence, profits.

Key words: knowledge work, measurement of knowledge work, productivity, measurement of coordination, OFA, EOA.

BUSI 831 "White-collar Productivity," Business, Vol. 33, No. 1, Jan./Feb./Mar. 1983.

The author provides an overview of white-collar productivity and bases his description on a 1983 study by the American Productivity Centre (APC). According to this study, considerable effort has been made to improve white-collar productivity in the United States, but there are a number of organizations where such action has not been undertaken. Companies which make an effort with respect to the productivity of their white-collar workers have shown average gains in effectiveness and efficiency of 9.5%. If the procedures used by the firms mentioned in the study were universally applied, this would yield savings of over $95 billion annually. The concepts of effectiveness and efficiency are not defined. Other observations were:

1. Organizations that introduced electronic information systems increased average productivity by 10.3%.

2. Over 30% of respondents worked on productivity in order to improve service or product quality.

3. Planning and implementation of programs took an average of six months to a year.

4. Some problems encountered were: inadequate measurement techniques, lack of management support and lack of knowledge by administrators.

Key words: productivity, white-collar workers, effectiveness, efficiency, information systems, APC.

BUSW 811 **"Challenge of the 80's: Solving the Office Productivity Puzzle,"** **Business Week, March 2, 1986, pp. 50-103.**

The greatest challenge currently facing most Western economies is that of productivity, particularly in the field of office work. The problem of productivity in organizations employing white-collar workers is often seen as a complex puzzle. There are concepts that organizations of all types and sizes can use as strategies for solving this puzzle, and thus increase their productivity. Some of these are:

1. Getting office workers involved: introducing office systems in an organization is a difficult task. It must be borne in mind that individuals and not machines remain the organization's most important resource. It is consequently necessary to involve them in all stages of planning. New technologies offer an opportunity to successfully conduct and facilitate a number of jobs, such as interpersonal communication, document creation and the management of decision-making, so almost all white-collar workers, and not just those performing repetitive activities, have the tools to enable them to significantly increase productivity.

2. Office technology and its applications: this section presents the various tasks that can be performed using the tools furnished by office systems.

3. System integration: it is not common for most systems, for example, telephones, typing, printing, microcomputers, to be integrated, that is to say, they normally perform independently. Skillful integration of different technologies leads to significant productivity gains. Many organizations are still in the early stages of this on-going process, that is, introducing new technologies in order to solve well-defined local problems within departments of the organization.

4. Leadership: the person in charge of office systems and implementing them should have considerable experience in the organization, since solving the office automation puzzle takes in human, economic and organizational aspects. It should be noted that office systems must be adapted to the individual organization, consequently, attempts to develop standardized systems and procedures can only result in failure.

5. Productivity measurement: once the pieces of the office systems puzzle are in place, organizations need to measure productivity. More specifically, the techniques of nominal groups and measurement by objective systems are briefly described as examples of productivity assessment.

6. Training: training is common to Japanese management and the development of human resources. When office workers are actively involved in the training and planning processes, the result is increased commitment to the goals of the organization, and a consequent rise in productivity.

As a last point, most of the sections of this article contain case studies.

Key words: productivity, white-collar workers, involvement, technology, system integration, leadership, productivity measurement, training, case study, Westinghouse Electric Corporation, I.N.A. Corporation, Equitable General Insurance Company, NOSC (Naval Ocean System Centre), Davis Polk & Wardwell.

CAMA 851 Campbell, Andrew, "Productivity Plans - Making Them Work," Business Quarterly Canada, Vol. 49, No. 4, Winter 1984/85, pp. 83-86.

This article analyses productivity programs. This type of program is being implemented today because corporations recognize that their survival, both domestically and internationally, may depend on increasing productivity. Implementing a program may be a difficult and risky matter if this is not strategically planned or custom-tailored for the given application. Managers are catalysts in this process, but the effectiveness of programs may vary depending on the skills and attitudes of employees and managers.

Most companies have the potential (human and capital) to increase their productivity. The most important step in this process, in Campbell's view, is deciding to undertake such a program. The CEO (Chief Executive Officer) must be responsible for instilling the desire to improve productivity and implement programs. Occasionally, however, the staff is unable to view the situation objectively, and an internal or external consultant may consequently assist significantly in promoting attempts to improve productivity.

Campbell explains that while a single productivity improvement program cannot be applied uniformly to all organizations, there are similarities between programs. Based on a survey conducted on 80 Canadian organizations, there are twelve characteristics common to all programs:

1. top management support so that productivity is regarded as crucial strategically and operationally,

2. establishment of a "productivity steering committee" to guide the program throughout the organization,

3. appointing a productivity administrator at the staff level,

4. appointing a productivity coordinator with responsibilities similar to those of the administrator but at the department and divisional level,

5. introduction of measurement tools to ensure that the program is working,

6. programs to improve productivity must be holistic in approach and permeate all levels of the organization to be effective,

7. the "top-down" approach should be considered to gain the support of all concerned,

8. effective communication helps employees to understand what is expected of them,
9. the training program must be appropriate,
10. management must transfer to staff a sense of responsibility for productivity improvement,
11. the program must be reviewed constantly and adjusted accordingly,
12. information sources are of two types: quantitative data and simple self-feedback.

A productivity improvement program is part of an overall process, but it is not a cure-all for performance problems. The key to success rests in a custom-tailored technique adapted to the corporate culture.

Key words: productivity, improvement program, "top-down" approach.

CANP 771 **Canada. Public Service Staff Relations Board, Pay Research Bureau.** **Productivity Measurement in the Public Sector**. **Ottawa, 1977.** pp. 1-15.

Chapter I: Productivity Measurement - What is it?

This chapter attempts to explain how productivity is measured in the public and private sectors and the limitations inherent to these measurements.

In general productivity is expressed as the ratio of output over input. To obtain a comprehensive picture of the total productivity of an economy, it is necessary to design a measure that combines the various outputs of all industries, which means that indexes must be developed. For output, the index often used is the readily available, but often inaccurate Gross National Product (GNP adjusted for inflation). When developing productivity indexes, the concept of "value added" is used as a basis for forming an output index. For example, Statistics Canada uses the double deflation technique to obtain an index of real net output, which is an index of the real value of added value.

Looking at the limitations of these measures, in the case of GNP there are incompatible outputs, for examples work performed by those working at home. Furthermore, it is difficult to obtain output measurements for some public services (for example, fire protection).

When measuring productivity in the public service sector, the important factor has to do with evaluating the outputs of these services. In the absence of an appropriate output measurement, the traditional practice has been to assume that most services are equal to the value of the input assigned to them. Consequently, implicit changes in productivity simply reflect structural changes in primary inputs and can thus not be interpreted as significant productivity ratios.

This chapter also defines some terms that often overlap in practice, such as efficiency, effectiveness and productivity.

Chapter II: Canadian Programs of Productivity Measurement

This chapter reviews methods used to provide acceptable statistics for measuring productivity in government operations and develop bases compatible with those of the private sector.

Since 1970, the federal Treasury Board has been conducting a program known as OPMS (Operational Performance Measurement) to measure performance, that is, efficiency, effectiveness, quantity and quality of output and variation in input, in several government departments.

The purpose of this program is to identify regions where operational performance may be improved and to develop output measurements on which managers may base their goals and objectives. The program may also be used for financial planning and program costing. The outputs chosen must meet certain basic criteria and be:

1. representative of work performed,
2. quantifiable,
3. repetitive and reasonably uniform over time,
4. accurately predictable,
5. mutually limiting to avoid double counting,
6. goal-oriented,
7. produced within a given time period.

For input measurements, "labor" is the most common base used.

Statistics Canada is also looking at measuring productivity in the federal public service. It hopes to develop an approach comparable to that used in commercial organizations, that is, using the traditional economic concepts of production, primary and intermediate inputs, and output or economic production. In other words, Statistics Canada is interested in measuring the economic production process and not the subsequent effects on the well-being of the population. It should be noted that this approach involves identifying outputs and the costs ascribed to them.

Key words: productivity measurement, public sector, output, OPMS (Operational Performance Measurement), value added, input measurement, output measurement.

CERR 851 **Cerveny, Robert P. and G. Lawrence Sanders, "Office Management: Increasing Productivity in the Workplace," Healthcare Financial Management, June 1985, pp. 60-64.**

Like most managers, health-care managers are seeking new ways to increase work productivity. For Cerveny and Sanders, the main challenge facing managers is implementing these new systems so as to ensure success. The authors first look at the following office automation technologies:

1. word processing and graphics,
2. electronic mail,
3. teleconferencing,
4. electronic calendar,
5. database management systems,
6. artificial intelligence,
7. decision-support systems,
8. local area networks.

Next, the authors state that the organizational and human problems encountered during implementation of office systems are factors that are more critical than the choice of appropriate equipment. Cerveny and Sanders propose a number of strategies to overcome these obstacles.

The initial stage for successful implementation involves setting up a committee to choose the elements of new technology that are relevant to the organization (in this article, a hospital) and to implement pilot projects for each of them. Since office automation often involves reviewing jobs, this may be the next source of problems. In the same way, it must be expected that implementing office automation will affect organizational strength. For all these and many other reasons, such as resistance to change and employee training needs, the authors suggest that external consultants be hired to assist with choosing and integrating office automation technologies. The advantage of these consultants is that they are aware of problems encountered in other organizations and can thus help avoid making similar mistakes.

With planning, the proper hardware and software, and attention to the human aspect, office automation should have a positive effect on employee productivity.

Key words: productivity, office automation, implementation, hospital sector.

CHAK 841 Charon, Kenneth A., "White-collar Productivity Measurement," Strategies for Productivity, International Perspectives. New York: Unipub, 1984, pp. 69-81.

The author presents a specific approach and measurement system used by IBM. This firm depends heavily on the system known as the Common Staffing System (CSS) or Functional Productivity System, used in calculating white-collar productivity, in particular that of management. The author, a manager at IBM, reports that an attempt has been made to reproduce an engineering approach, including such things as developing a workload measurement system with the following characteristics:

1. It must be simple and understandable,
2. It must be usable at all levels of the organization,
3. It must permit identification of efficient sectors,
4. It must be transparent, so that valid comparisons may be made.

The CSS approach covers 135 job activities, defining what tasks must be performed, and 57 causes of work, identifying the reason. Data are twice yearly twice yearly in all the countries (16) where IBM operates. Following compilation of the data, productivity estimates are calculated in three different ways:

1. productivity comparisons between individual countries and for the various functions within a country: the base for comparison is a weighted ratio of results obtained; the relative productivity may thus be compared for each of the 135 activities;
2. procedure to plan productivity in the future: the data compiled in (1) are used for intelligent resource planning and to identify activities where productivity might be improved;
3. assessing the productivity change that has occurred in each country between the current and previous surveys: this assists in tracking the system.

Charon claims that the IBM approach can mean substantial gains for any organization. He further emphasizes the importance of involving as many employees as possible so as to increase the company's productivity.

Key words: white-collar workers, productivity, IBM, CSS, productivity measurement.

COLR 841 **Cole, Robert E. and Dennis S. Tachiki, "Forging Institutional Links: Making Quality Circles Work in the U.S.,"** National Productivity Review, Vol. 3, No. 4, Autumn 1984, pp. 417-429.

The authors discuss the top three problems that hinder the spread of quality circles -- whose purpose is to increase worker satisfaction, product quality and productivity -- and solutions for them. Cole and Tachiki conducted a survey of 176 organizations using this process, with a view to showing that companies that adjust their organization using these circles are more likely to be successful.

The first problem is management resistance. Many middle managers feel that their authority and position are threatened by the existence of quality circles, which often result in organizational changes. A second obstacle is lack of top management support, which is not necessarily due to a lack of information, but rather to the credibility of this information.

To better use the contribution of a circle's activities, one solution is to implement a measurement system based on the goals adopted by the circle. Technical personnel might be involved in a move to clarify the contribution of the circle with respect to organizational needs, or a consensus could be obtained from all personnel. To remedy the problem of lack of consensus due to employee apathy or resistance, the greatest possible number of workers must be involved. Financial incentives such as profit-sharing are not absolutely necessary to achievement of this goal, particularly if social rewards are more evident.

The authors conclude that quality circles are a fragile process which consequently require all available institutional support. To increase effectiveness, it should be considered as a long-term commitment whose activities are strategic, non-static, central and of a routine rather than an exceptional nature.

Key words: quality circles, management, middle management, technical personnel, organizational adjustment, performance measurement.

COND 721 Conrath, David W., Measuring the Computer's Impact on Organizational Structure, Univ. of Waterloo, Ontario, Canada, 1972, pp. 68-73.

An organizational structure is described here as a set of relationships between people who are members of that organization. In order to fully understand the nature of the organization, it is essential to see it as a communications network. Conrath notes that in most cases new communications technology was introduced without considering its impact on the structure of interpersonal (or operational) relations. With respect to measuring these impacts, the author notes that, since there is no unambiguous concept of organizational structure, there accordingly can be no one measurement system applicable to all, and a number of dimensions must be considered. The appropriate format for representing a variety of structures must take account of spatial relations within the organization. Conrath considers an organizational structure as a set of relations that are dyadic (combination of two principles that are reciprocally complementary), which he represents by a symmetrical matrix in which the lines and columns represent members of the organization. Communication may also be represented using a matrix. One method for measuring change in organizational structure is to consider each dyadic relation as independent, while another is to establish relational groups.

Based on an empirical study involving 350 managers and professionals, the author was unable to give calculated results of the impact of computer-based communication systems on organizational structure. More organizational research work will be required in the future. Conrath does note, however, that the initial use of computers probably has little effect on existing communication patterns. In the medium and long terms, we mainly see a restructuring of the organization rather than reinforcement of certain dimensions. In conclusion, the author remarks that most of the impact is based on the development of software that assists and increases interpersonal interaction. It remains to be seen how this will affect the structural properties of the organization.

Key words: organizational structure, communication system, computer, impact measurement, interpersonal relations.

CONH 841 Conn, Henry P., "Improving Use of Discretionary Time Raises Productivity of Knowledge Workers in Offices," Industrial Engineering, Vol. 16, No. 7, July 1984, pp. 70-77.

Employment costs for managers and other professionals currently amount to some $500 billion annually in the United States, and the author predicts that by 1990 these costs will reach $1.35 trillion. This article is centred around the use of discretionary time, which is seen as the time spent creating ideas, projects and objectives. The performance of this time must be improved in order to increase productivity in the business world.

The information process and resources are the keys to this impovement. Information is the vital organizational energizing force, especially among decision-makers. The three primary variables that influence knowledge worker productivity are:

1. external influences,
2. internal influences,
3. peer group influences.

For Conn, the best and only valid method currently available to measure worker productivity is year-to-year comparison of the company's productivity figures. The author then describes two methods for improving productivity: 1) MNI (Mutual Needs Inventory) and 2) NGT (Nominal Group Technique). In his view, NGT is the better method, covering five phases:

1. silent generation, group members write their responses to task statements,
2. round robin,
3. clarification and explanation of solutions,
4. voting and ranking,
5. discussion, permits participants to express their individual evaluations.

Also of interest is the short summary of a Booz Allen study aimed at determining how to implement an automated office system to improve knowledge worker performance in the public and private sectors. The 1980 study reached several conclusions, for example:

1. cost/benefit analysis showed that in 1985 automated office systems would save 15% of knowledge workers' time,
2. analysis of samples shows that 15 to 40% of knowledge workers' time is spent on activities that are not fully productive,
3. knowledge workers spend 4.8 hours a day on primary tasks.

Key words: productivity, performance, Booz Allen and Hamilton, discretionary time, methods, information, NGT, MNI, automated office system.

CONJ 812 **Connell, John J., Productivity - The Challenge of the 80's, Papers from the IX Syntopican (reprinted with the permission of the Office Technology Research Group), Atlanta, June 29-30, 1981, pp. 1-11.**

The need to increase productivity in the office is an economic one. Offices are still not managed along economic lines, and managers could adopt better management practices. The program proposed by Connell, which considers the office as an economic entity, is broken down into three stages:

1. developing a set of economic indicators in order to arrive at an economic image of the office and a basis for measuring how activities are carried out,
2. identifying opportunities for increasing productivity (all members of the organization should participate in this effort),
3. developing approaches to measuring the economic gains of productivity.

The author claims that attempts to improve productivity should be aimed at managers and professionals; however, their work is rather qualitative in nature and thus does not lend itself well to mathematical measurement. Connell nevertheless gives some indication of how this might be done. First, it might be considered that productivity applied to managers is a characteristic of performance and should thus be measured using performance systems such as management by objectives (MBO). Next, we might consider that the productivity of managers as a class is an economic characteristic which should be measured in terms of variation in return on investment. There are four other broad fields in which modern technology can assist in improving the performance and productivity of managers and professionals:

1. saving time,
2. redistributing work load,
3. becoming better informed,
4. facilitating communication.

For Connell, the most important contribution of the 1980s is the interconnection of office technologies through networks. Networks involve the work of various types of machines, languages, techniques and the need for a coordinated plan. They bring the power and capacity of modern office technologies to each employee, with each technology being a sub-set of the network. This type of undertaking thus has a substantial impact on organizational structure and office practices. It is noteworthy that networks

do not change the intellectual aspects of decision-making, nor do they replace the work of planning, management and control. The network keeps the management process down to the essential through access to information and ease of communication. However, the impact of networks on organizations is as yet unknown. Productivity increases are anticipated, but these will depend to a great extent on user acceptance, and this is a behavioral rather than a technical problem. For the moment, the challenge is thus to advance the training process and reach a better understanding of the impact of networks on organizations.

Key words: productivity, managerial performance, economic indicators, communications network, information, office management, MBO.

CONJ 861 **Connell, John J., "It's Time to Let the User Assume a Role in Managing Information," Executive Newsletter, February 1986.**

This article focuses on two aspects: 1) improving white-collar productivity and 2) the new role of users in managing information. The author uses these two premises to present six factors that justify changes in the way technology is managed:

1. technological potential through working groups and information centres;

2. the need to improve white-collar productivity, particularly that of managers and professionals who account for the greatest share of the payroll; the goal is not to increase individual efficiency, but to increase the organization's efficiency in carrying out its mission;

3. competitive strategies: intensifying competitive performance involves improving productivity by using the technological tools available; moreover, it has been proven that information technology has opened new markets and created new products through cooperation with users;

4. information processing systems for MIS (management information systems);

5. users who become directly included in MIS;

6. MIS, its orchestration and growing role; managers and professionals must have direct access to the information they need, reliably and accurately.

Key words: white-collar workers, productivity, MIS, technological potential, competitive strategies, user.

CULM 831 **Culnan, M.J. and J.H. Bair, "Human Communication Needs and Organizational Productivity: the Potential Impact of Office Automation,"** Journal of the American Society for Information Science, Vol. 34, No. 3, 1983, pp. 215-221.

The purpose of this article is to examine the potential impacts of office automation on organizational communication and subsequently on organizational productivity. Office automation is one of the means by which an organization can increase its information-processing capacity; however, a number of variables must be considered in order to understand how office automation can further this effort.

First, there are communication purposes, which are information, control, motivation and emotional purposes. Next comes the mode of communication. Third is the direction of communication, either vertical or horizontal. For the fourth variable, the authors mention two types of communication based on timing (synchronous and asynchronous communication). The last variable mentioned is that of organizational structure and norms.

Culnan and Bair then turn to the question of the impact of office automation on communication. The primary impact is substitution of new communication modes such as electronic messaging. It is noteworthy that the degree of substitution depends on two major factors: purpose and the communication style of the communicator.

The authors next look at the potential benefits of office automation. The first set of benefits can result from meeting user needs. Other advantages may come from automating a manual procedure, reducing time or increasing control for better planning. They nevertheless point out the drawbacks associated with automation, such as increased stress and the feeling of physical and social isolation from spending long periods of time in front of a computer terminal. Culnan and Bair suggest some general principles for successful implementation: encouraging acceptance of the system, adequate support, adequate level of use, etc.

The authors conclude with the hypothesis that substitution is necessary if the positive impacts of office automation are to be realized. When technology is an appropriate substitute, office automation offers an opportunity for new and efficient alternatives for communication.

Key words: impacts, office automation, communication purposes, communication mode, productivity, organizational structure, potential benefits, direction of communication, type of communication, implementation principles.

CURK 821 Curley, Kathleen Foley and Philip J. Pyburn, "Intellectual Technologies: the Key to Improving White-collar Productivity," Sloan Management Review, Vol. 24, No. 1, Fall 1982, pp. 31-39.

Some companies experience control crises following introduction of word-processing equipment. People who acquire experience using "intellectual" technology extend its application beyond what was originally planned, thus coming into conflict with efficiency goals set by management. Intellectual technology is difficult to define because its function is not clearly determined by its physical design. The main feature of these technologies is that they allow users some liberty in defining the functions and applications of the machine, that is, they are programmable. Intellectual technologies are limited by the user's imagination. The scope for use of these technologies is broader than that of industrial technologies: because of this flexibility, those using intellectual technologies are constantly learning and revising the methods by which they solve their problems and their information processes. The real advantage of these technologies is that they spark fundamental changes in the way people work. If correctly managed, these changes may lead to increased productivity.

In their study, the authors observed that very few organizations used new intellectual technologies to increase total organizational productivity rather than simply the productivity of typists. The first requirement is to re-evaluate the status of jobs, as well as to restructure and delegate them. This is an on-going process of learning and assessment. Curley and Pyburn make the following recommendations to managers on how to implement intellectual technology:

1. Be prepared to experiment: it is important to recognize that the potential contribution of intellectual technologies to total productivity requires an ongoing learning process.

2. Be explicit about managing the learning process: provide and encourage the necessary training. Once a certain level of competence has been achieved, managers can begin to identify and work on areas where productivity improvements may be made.

3. Formulate a technology plan: it is important to link planning for intellectual technology to the overall business planning activities. It is also essential for the company to identify technological development trends so as to make purchasing decisions in line with them.

4. Implement intellectual technology in the context of the corporate culture.

By using this implementation method, the authors prove that the most important thing is not technology itself, but rather how it is used.

Key words: technology, productivity, implementation method.

DEUS 821 **Deutsch, S.J. and C.J. Malmborg, "The Design of Organizational Performance - Measures for Human Decision making. Part I-II - Description of the Design Methodology and Implementation Example,"** **IEEE Transactions on Systems, Man and Cybernetics**, Vol. 12, No. 3, 1982, pp. 343-359.

This document, which deals with the methodology for designing organizational performance measures for decision-making, is divided into two parts. Part I is a description of the structure of the model developed by the authors. The approach is to use a matrix describing the objectives of management in measuring performance to develop a preference function in order to adopt the appropriate performance measures. In addition to measuring the value of the information provided for performance evaluation, this function details the effects of information on the capacity of the decision-making process.

An overall objective criteria trades off the value of information content and the effects of information overload within an optimized framework aimed at determining the properties of an "ideal" performance measure.

In the second part, the methodology for designing organizational performance measures described in Part I is applied. It is demonstrated that this performance-model approach must be based on the conditions governing specific problems.

Each sequence of steps described in Part I is carried out in the context of measuring the performance of inspection personnel for a manufacturing concern. These steps include construction of the objective matrix, assessment of information preference functions, specification of the parameters of the information penalty function and solving the instrumental design problem.

Key words: performance measurement, organizational performance, method.

DESG 841 Dess, Gregory G. and Richard B. Robinson Jr., "Measuring Organizational Performance in the Absence of Objective Measures: the Case of the Privately-held Firm and Conglomerate Business Unit", Strategic Management Journal, Vol. 5, No. 3, 1984, pp. 265-273.

Researchers often encounter problems in obtaining valid objective measures for organizational performance, mainly due to the confidential nature of certain data and variations in the accounting procedures used. Regardless of the structure chosen for conceptualizing organizational performance, it is apparent that this concept is a complex, multidimensional phenomenon.

This study looks at the usefulness of subjective measures as possible means for validating two commonly used economic indicators: return on assets and growth in sales. In all, 26 manufacturers in the paint and allied products industry participated in the study. There were three phases to the research: interviews with the CEO of the company, followed by a questionnaire, and then a questionnaire to the top management team. The study also sought to determine the relation between:

1. subjective and objective measures of "return on assets" and growth in sales",

2. measures of "return on assets" and "growth in sales" and overall performance measures.

The results indicate that subjective perceptions are closely linked to objective measures of performance. This study does not, however, suggest that subjective measures are preferable to objective measurement. The conclusions rather suggest that a researcher might consider using subjective measures in at least two aspects of organizational performance under two specific conditions:

1. accurate objective measures are not available,

2. excluding subjective measures would be equivalent to removing consideration of performance from a study, but they would most appropriately be used in analysing relative performance within a given industry.

Key words: performance measurement, organizational performance, case study.

DIEG 821 **The Diebold Group Inc. (The Diebold Automated Office Program), Productivity Casebook: Measuring Organizational Performance, New York: 1982.**

This document is part of a Diebold Automated Office research program on white-collar productivity. It is divided into two parts: the first deals with the theoretical framework and operational performance measurement, while the second presents practical experience in productivity measurement.

The first section, on the Diebold office automation program, consists of examples of productivity studies. Each of these approaches explicitly demonstrates the need for more open areas of communication with management, particularly with regard to decisions to invest in office automation. The absence of a conceptual structure that would permit analysis of organizational elements is a major obstacle to defining productivity measurement and improvement among white-collar workers. The author notes that the various approaches to defining white-collar productivity measurements tended to be linked to specific concepts. Consequently, models and measurement instruments were developed which applied to very specific work environments.

The Diebold Group proposes the following approaches and evaluation methods:

1. organizational structure evaluated using organizational analysis and management by objectives methods,
2. functional activities evaluated using common staffing analysis, multiple regression and conventional work measurement methods,
3. Service Interchange Structure, based on an analysis of the values, architecture and structure of information, analysis of systems and procedures and the simplifying of participative work,
4. physical resources and technological structures,
5. human resources structure, in fact, a meaningful analysis of the structural elements of an organization means analysing the composition of each element.

After presenting the various approaches, the authors suggest jtudying productivity using a strategic approach, that is, adopting a systematic method which takes into consideration all factors of a system. The first section concludes with standards that can be used as a basis for productivity measurement. This method, prepared by the Strategic Planning Institute, involves comparing value added per employee in one organization with that for other similar companies.

The second part of the document presents and reviews case studies of 11 organizations that undertook major programs to study and measure white-collar productivity. This part is divided into three sections, each of which reflects the nature of the approaches examined.

The first section, which deals with the use of subjective measurement, describes the approaches and experiences of the following companies:

1. International Business Machines: study of human behavior and types of communication.
2. Bell Laboratories: effectiveness of audiographic teleconferencing.
3. Westinghouse Electric Corporation: Multivariate Trend Analysis.
4. Bethlehem Steel: study of obtaining worker acceptance.

The second section, dealing with the development of standard measures, contains the following experiences and approaches:

1. Rome Air Development Command: analysis before and after implementation of office systems.
2. United States Air Force - Electronic Systems Division: five-stage approach to productivity measurement.
3. Bell Northern Research Limited: assessment and measurement of organizational performance.
4. Bank of America: a justificative approach to systems.

The third and final section covers the concepts of return on investment and value added, and studies the following cases:

1. The Upjohn Company: application of value-added models to measure labor productivity.
2. Lincoln National Life Insurance Company: work on cost justification.
3. GTE Service Corporation: use of demographic analysis.

Key words: productivity, white-collar workers, productivity measurement, case study, Diebold Group Inc., return on investment, value added.

EDPA 811 "The Challenge of Increased Productivity," EDP Analyser, Vol. 19, No. 4, April 1981.

This study deals with the motivation and guidance of personnel working with computers. It also indicates how to achieve significant productivity gains. The author cites the Monsanto experience as an example of a successful approach to office automation.

This company used a three-phase program. The first phase was that of office design in order to improve the working environment and provide flexibility for future change. Phase 2 was a work effectiveness program to determine problems in work situations and implement solutions to remedy them. The third phase was the introduction of new technology. The main point the author wishes to stress here is that computer technology alone will probably not bring the productivity gains sought by all concerned.

The key to increasing productivity is personnel: technology can assist employees to do their work better if they are willing to use it. Productivity growth thus depends, according to this study, on employee attitudes to their work and their feelings about the treatment they receive from the administration. Another significant contribution of this article is a list of factors that might help increase productivity and competitiveness. These are:

1. measuring current employee attitudes (for example, JDS),
2. studying options in the use of technology,
3. insistence on product quality,
4. employee training,
5. management by objectives for the organization,
6. new job definitions and descriptions,
7. measuring progress,
8. repetition of this process in order to refine the work environment where necessary, etc.

Key words: productivity, office automation, motivation, effectiveness program, technology, ergonomics, quality, JDS, Japan.

FEIE 771 **Feist, Edward F., "Measuring Productivity of Data Entry Operators," The Office, Vol. 84, No. 4, April 1977.**

This article describes measurement of the performance of data entry operators. The first step in developing such a system is defining objectives in order to determine "why and how." Elements that may be used to measure performance are:

1. operator classification,
2. work schedule,
3. budgeting,
4. training programs,
5. wages,
6. government implications.

The author next details five major operations performance factors which are measurable and objective. The first has to do with employee attendance, which is measured by the number of times an employee is unavailable for work. A simple way of calculating the value of time lost is to examine the total number of days lost and the total number of working days. The second element is quality. This is an important factor, since it shows the number and type of errors made by operators (a formula is developed in the article). Third is quantity. This is the bottom line in calculating operator performance. The simple index method is a quick, easy calculation, in which the quantity of data entered per hour is posted to a table. There is one essential basic hypothesis: to be compared, all operators must have the same level of experience. The fourth factor is machine use. The number of hours produced by the employee is examined using a basic criterion (predetermined number). The last factor is flexibility. This represents the number of different tasks a person knows and his or her ability to learn a task. Flexibility is important in a context where there is a wide variety of tasks.

To measure performance, standards and a reporting system must be developed. A standard is a forecast of results. The reporting system is a set of data covering a period of time. It permits measurement using six main factors:

1. departmental, employee and equipment costs,
2. the time a job may take,
3. identification of the best employees,
4. time required for an employee to become effective,
5. percentage of productive time,
6. frequency of overtime and time not available for work.

Key words: performance measurement, objectives, quality, attendance, quantity, flexibility, performance standards.

FELG 831 **Felix, Glenn H. and James L. Riggs.** Productivity Measurement by Objectives. Corvallis, Oregon: Oregon Productivity Center, Oregon State University, 1983.

It is not easy to adequately measure productivity. At the Oregon Productivity Center, it is felt that the answer to this problem lies in the effective use of an objective matrix. This article studies the methodology of using this tool.

The objective matrix solves the problem of complexity in productivity measurement by combining significant organizational productivity criteria into a matrix format. Briefly, by setting up a numerical system, managers of organizations select an arrangement of criteria that are relevant to the specific productivity mission and calculate the results of these criteria so as to obtain an overall productivity index. Since the criteria are normally not all of the same importance, they are also weighted according to their relative importance.

Felix and Riggs stress that one advantage of the objective matrix is that it is applicable to both white and blue-collar workers. Moreover, the construction and implementation of the matrix require relatively little expertise. Under the direction of a coordinator, managers would ideally work together with employees to develop a matrix for each of the operating units. The following are the stages in constructing an objective matrix:

1. Determining criteria: these criteria are often linked to factors such as quality, quantity, personnel changes, etc. Normally, a ratio is formulated for each criterion which reflects the specific focus of attention, whether on efficiency, effectiveness or inference.

2. Clarification of data: each criterion must be explicitly established, along with data availability.

3. Evaluation of current performance.

4. Assignment of performance objectives and definition of these objectives.

5. Weighting of the various criteria.

6. Implementing the matrix in the organization: if the organization is made up of a number of different units, the authors suggest using several objective matrixes, one per unit, so as to obtain an overall index of organizational productivity. The index for each contributing unit should, however, be weighted so as to reflect its importance in the mission of the organization. Following this stage, the efforts of all must be directed towards the goal of improving productivity. Employee training and involvement can help achieve this end.

It should be noted that another work in this annotated bibliography, coded RIGJ 851, also deals with the objective matrix as a means for increasing productivity.

Key words: productivity, productivity measurement, objective matrix.

FORR 851 Ford, Randolph J., "New Approaches to Improve White Collar Productivity," Industrial Engineering, Vol. 17, No. 8, August 1985, pp. 48-61.

This article reviews five new approaches for dealing with the issue of white-collar productivity. For Ford, these techniques are necessary because traditional industrial engineering techniques are only marginally effective when applied to white-collar productivity. One possible reason lies in the nature of the white-collar worker's job. These techniques attempt to provide a remedy to the obstacles white-collar workers must overcome and generally involve such issues as the structure of the organization, channels of communication, the work environment and the skills of the individual. Let us take a closer look at each of these techniques.

1. Operational Function Analysis (OFA) is the study of each function necessary to the operation of an organization. It is based on the idea that demand, both internal and external, drives business functions and that analysis of these demands and the resulting need for information and services holds the key to improving the overall level of organizational performance. An OFA team formed by representatives from each department generates improvement ideas. Using this process, developed by Bumbarger, interactions between work groups and departments can be clearly visualized through a network of interacting demands. This helps see how each group fits into the organization and thus promotes unity.

2. Mutual Needs Inventory (MNI): this technique, developed by Ira Gregerman, works to establish the interdependency of functional units within the organization. Each unit identifies its needs for information and service in an atmosphere conducive to cooperation. During the formulation of action plans, several positive results, such as reduction of redundant tasks, emerge producing improvements in white-collar productivity.

3. Nominal Group Technique (NGT): used to flush out productivity obstacles in each department. This technique inspires group interaction to solve common problems. The phases of a session are simple:

   a) statement of problem as specifically as possible,

   b) silent generation of ideas for solving problem by all members of group,

   c) recording of the various ideas,

   d) discussion and clarification of ideas,

e) Note: a majority vote must be obtained to identify the solution to the problem,

f) implementation and follow-up.

4. Office automation: can contribute to the effectiveness of information processing and thus have a positive impact on productivity. Implementation must, however, be carefully planned and managed.

5. Improshare - improved productivity through sharing: the basic principle of this approach is personnel motivation, while the objective is increased productivity. To accomplish this, any productivity gains are shared between the company and the workers. At the start of the plan, a base productivity factor is calculated. Productivity gains are tracked and the equivalent cost savings divided between the company and the workers. All workers maintain parallel interest in a common goal, that is, increased wages through productivity. Many of the obstacles usually encountered by management (for example, resistance) in its attempts to improve productivity are eliminated almost automatically.

Key words: productivity, white-collar workers, improvement techniques, MNI, NGT, OFA, office automation, improshare.

FUHJ 851 Fuhr, Joseph P. and Bernard J. Reilly. Productivity in the Service Sector. Chester, Pennsylvania: Widener College, 1985.

The service sector has replaced the manufacturing sector as the main creator of jobs in the economy. Consequently, productivity in this sector takes on considerable importance, not only because of its rapid growth, but also because many feel that job growth is due to a lower rate of productivity in the service sector. The problems involved in measuring productivity challenge us to develop a meaningful definition of productivity.

Fuhr demonstrates that the historical definition of productivity in the manufacturing sector, that is, output per hour per person, does not apply to the service sector. As opposed to each output in the manufacturing sector, the output of the service sector is multidimensional and varies widely in quality. Another distinction between the service and production sectors lies in the role played by technology. In the manufacturing sector, technology is used to increase output, quality and efficiency, which in turn brings an increase in productivity. While in the service industry, technology is used to extend the range of information possessed, as well as employee skills, and these will increase productivity.

The fact of having more than one measure of productivity is unique to the service sector. Given the difficulty in defining output, using more than one measure is often considered the correct method. The author proposes two approaches to alleviating this problem, one being to have more than one definition of output for a given service, the other being the development of a set of productivity measures for this service. In the case of multidimensional services, Fuhr suggests the use of a weighted mean of the various activities making up the service.

One factor that might explain why productivity is felt to be lower in the service sector is the existence of government regulations and non-profit organizations. For some time now, there has been a movement toward deregulation. Some data suggest that this movement will have a positive impact on productivity, but Fuhr notes that more information is needed before this relation can be positively established.

Key words: service sector, productivity (definition), productivity measurement, output.

GANS 851 **Ganus, Susannah S., "Office Computers: Managing the Human Impact," The Journal of Information and Image Management, Vol. 18, No. 213, March 1985, pp. 26-31, 62-63.**

Too often, says the author, technology is seen as a panacea for office productivity problems. Office automation is not only a multifunctional system of modular equipment, it is also a dynamic, continuous process involving interacting office elements, that is, people, information, functions and procedures. A widespread approach to the use of office automation is based on the need to increase productivity. For Ganus, there are other equally important criteria, such as quality of work, better use of human resources, job enhancement and increased skills and competence.

Many organizational problems come to light when office automation is introduced:

1. assigning priority to tasks becomes more important,
2. the situations, tasks, goals and values facing workers must be better represented before the new technology can be used to improve such things as productivity and quality,
3. the new system must be evaluated,
4. the new system must be improved and adjusted as necessary.

Two opposing trends are developing with respect to job prospects:

1. the multifunctional nature of the new technology changes the distinctions between various types of jobs, and it might therefore be thought that office automation will lead to the creation of more skilled jobs,
2. the new technology creates rather unsatisfying jobs, such as repetitious data entry.

In concluding, the author lists the stages involved in successful implementation of automated information systems:

1. Analysis of what is being done and what we would like to do.
2. Description of the required equipment, procedures and knowledge.
3. Design, taking into account human factors linked to the workplace (ergonomics).

4. Implementation, which should involve the participation of users at all levels, in addition to ensuring that the new knowledge required is developed through continuing training. It is noteworthy that resistance to change should be analysed with a view to responding to user needs.

5. Operation, maintenance and assessment.

The goal is thus not to automate the office for the sake of office automation, but rather to make work more beneficial and the working environment more human, creative and productive.

Key words: office automation, implementation, impacts, ergonomics.

GASD 821 **Gascon, Denis and Paul-Martel Roy, La productivité dans le secteur public : les écrits récents (1975-1982) sur le sujet, particulièrement ceux qui portent sur le Québec, Montréal: Laboratoire de recherche sur l'emploi, la répartition et la sécurité du revenu (LABREV), Université du Québec à Montréal (UQAM), October 1985.**

The growth of the public-administration segment of the economy since 1960 has led economists and managers to look more closely at this sector, despite the fact that concern with productivity had long been judged incompatible with the public sector. In Quebec, interest in productivity in the public sector was first officially recognized in 1982 with the Bisaillon Commission on the public service. This new concern once again turned the spotlight on the problems of applying the concept of productivity.

Productivity is a concept that comes from the private sector, and is defined as a technical ratio between goods and services produced and the resources used to produce them. This technology can, however, be misleading: we think we are capturing the essential information about productivity when we are only isolating what is quantifiable. For Gascon and Roy, productivity in the public sector should lead to measurement of quality and need satisfaction.

The authors also deal with the problems of measuring productivity. In the public sector input and output are so problematic and difficult to define with certainty that economic theory has turned to measuring cost growth in the public sector. For example, Baumol established in 1969 that economic growth increases the relative cost of labor through the growth in salaries. In some sectors, such as education, there has been an increase in costs without a corresponding increase in productivity. As a consequence, it is important that we develop multiple, complex indicators.

The 1970s, both in Canada and the United States, saw the development of a long series of productivity indicators. In Quebec, productivity was examined in comparison with Ontario, although evaluating productivity by comparing Quebec and Ontario mainly reveals the influence of the economic structure on the cost of public services.

Next, the authors list a number of American, Canadian and Quebec examples of the development of productivity indicators, as well as the results they yielded. Recent developments in Quebec with respect to productivity in the public sector are indicative of a new approach in this field. Based on a philosophy of technology and efficiency, we are heading, as Gascon and Roy put it, to a "management"-type function. Qualitative measures are important, but they must co-exist with motions of motivation and individual needs. The Bisaillon Commission translated this approach to productivity in terms of participation, consultation and professional relations.

Key words: public sector, productivity, productivity (definition), measurement problem, indicators.

GREI 811 **Gregerman, Ira B.** Knowledge Worker Productivity. **New York: American Management Association, 1981.**

The author presents the knowledge worker and his work. He describes and compares such workers and presents models for measuring, assessing and improving their productivity.

The document contains three sections:

1. the rise of the knowledge worker,
2. tools for improving knowledge worker productivity,
3. tools for measuring improvements in productivity.

First, a brief description is given of the evolution of knowledge workers as an employee group distinguished from white-collar workers by eight characteristics dealing with job planning, creativity, innovation and decision making.

The author presents five primary characteristics that distinguish the knowledge worker group from others. After presenting the knowledge worker system of values as seen by R.J. Howe and M.G. Mindell, the author concludes the first part with an examination of internal and external factors that might affect the productivity of knowledge workers.

In the second part, the author recognizes the fact that it is difficult to measure the productivity of knowledge workers. In his view, the best method is currently that which compares measurements of the productivity of organizations from year to year.

Three methods are examined:

1. The Nominal Group Technique (NGT): this is a technique based on the fact that collective effort can greatly enhance the creativity of a group. NGT seeks to develop and increase knowledge worker productivity through encouraging intrafunctional brainstorming.
2. The second method, known as the Mutual Needs Inventory (MNI), stresses interfunctional cooperation. It may be summarized by saying that a company's productivity will rise if its various functions are made to work together more harmoniously. This can be accomplished through periodic meetings at which each function specifies what it needs from the others.
3. The third approach, entitled Performance Evaluation Matrix (PEM), is a method that uses performance evaluation as a tool to improve knowledge worker productivity by having the workers themselves establish the objectives against which they will be judged.

This method enables workers to develop a more active interest in attaining these objectives.

The third part of this document examines two tools for measuring productivity improvement.

The first, known as the Comparative or Common Staffing System (CSS) was developed in the 1960s by IBM, which used it to assess the productivity of various indirect labour groups.

The main objectives of this method are:

- to identify areas of opportunity for potential productivity improvement,
- to enable each location to measure and track labor productivity,
- to provide measurement models to allow for comparisons between plants,
- to allow measurement of productivity improvement efforts,
- to provide a foundation for estimating manpower requirements.

Five stages are needed to implement this method:

1. defining activities to be measured,
2. establishing indicators,
3. collecting data,
4. analysing data,
5. interpreting results.

The second tool, called the Performance Measurement System (PMS) and developed by the American Productivity Center, is a total productivity analysis method which calculates the productivity of each input, and of all inputs combined, in relation to total output.

The following information is required for this method: the value, quality and price of each input or output to be analysed, each for a given time period.

The author proposes several case studies to illustrate some of the methods.

Key words: productivity measurement, improvement measurement, PMS, IBM, PEM, MNI, NGT, productivity, APC, CSS.

GRIR 831 **Griffin, Ricky W., "Objective and Social Sources of Information in Task Redesign: A Field Experiment," Administrative Science Quarterly, Vol. 28, No. 2, June 1983, pp. 184-200.**

In this article, employee perceptions and reactions to work are studied through the effects of objective task changes and informational cues from supervisors. Griffin notes that the idea that the social environment can influence employee perceptions, attitudes and behaviors is a central element in organizational science. He adds that, when employees describe their perception of their work, they draw the relevant information from objective, social and personal sources. Following these remarks, the author formulates several hypotheses which he tests on employees of two highly similar manufacturing plants.

In Griffin's analysis, informational cues were specifically directed at core task attributes such as feedback, variety, autonomy and identity. The author measured four categories of outcome variables:

1. core task attributes,
2. interpersonal task attributes,
3. affective reactions (satisfaction),
4. productivity.

The results of his experiment indicate that objective task changes and supervisory cues influence core task attributes, interpersonal attributes and affective reactions.

In addition, objective task changes seemed to influence employee productivity while no relation was discovered between productivity and supervisory cues. Griffin mentions the limitations of his study and suggests interesting avenues for further study, such as the role of expectation effects in organizational change programs and the nature of the social work environment.

Key words: tasks, organizational science, measurement, productivity, supervision, case study.

GRIW 851 **Griffith, W.I., "Differentiation, Effectiveness and Productivity: Social Psychological Bases of Organizational Performance," Social Science Journal, Vol. 22, No. 2, 1985, pp. 31-45.**

For some time now, attempts have been going on to prove the relationship between group behavior characteristics and performance variables at the organizational level, such as productivity and effectiveness. Griffith describes some basic theoretical tools, using a mathematical and empirical model, to determine these relations in simulations of small organizations.

In his study, the author develops a formal theory of organizational effectiveness. This theory makes use of a set of propositions drawn from the theory of social power -- relations between the initiative of a directive act and how the act is received -- in order to define the antecedent conditions that produce organizational effectiveness.

The author demonstrates mathematically the connection between the internal power structure of a group and its relative effectiveness in connection with the organization. Effectiveness is the central feature of this link between the social psychological structure of groups and their organizational performance. This research deals mainly with the following two elements:

1. the group effectiveness function,

2. the relation between effectiveness, product quality and productivity.

These two relationships are of the greatest importance, since they define the links between psychosocial variables and performance variables. The productivity of a group may thus be seen as the result of relations involving these two types of variables.

Key words: organizational performance, productivity, effectiveness, quality, behavioral characteristics.

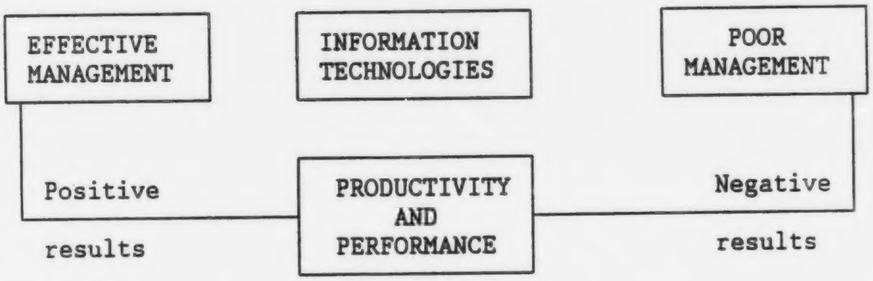
GRUT 851 Grusec, T., Office Automation and Productivity in Government Offices, Ottawa: Canada. Department of Communications. July 1985. (Office Communications Systems Program; 4)

This document is based on Canadian government experience with office automation, which in reality involved testing prototypes. The reader should bear this in mind when reading the text.

The author introduces the notions of economic production and productivity in federal government evaluation. Based on national accounting practices, this productivity is considered to be constant.

The author recognizes the major problems involved in measuring productivity in offices, although he does not exclude certain statistical criteria. He presents the statistical methods used by Statistics Canada, as well as the value added approach developed by Paul Strassmann, who concludes that information technology has not brought an increase in productivity and, in certain cases, has even had a negative effect.

To explain the nature of office work, the author distinguishes between the concepts of procedural and non-procedural work and their relevance to the vertical hierarchy of the office. Information theory can describe the activities of an office, but promotes a questionable stereotype of the work itself, particularly with respect to non-procedural work.



In describing the various activities of procedural and non-procedural work, the author states that any time gained as the result of automating an activity should have a positive effect on all related activities. Re-evaluation of tasks thus becomes a priority.

Since executives, managers and professionals are responsible for attaining objectives and not for their behavior and activities in working towards these objectives, this becomes the key point that virtually defines non-procedural work and places it outside any definition of productivity.

The importance and benefits of electronic information systems result in two major considerations:

1. Justifying costs, which is very difficult to evaluate, even at the individual level. As well, justification must consider the actual situation of the office, both specific and general, and the organizational context.

2. Study of needs and implementation depends on our understanding of office work seen as procedural (non-procedural). Analysis of the procedural mode is consequently directly linked to the process of change rather than transformation. For this reason, office automation is increasingly a far-reaching change in the way work is done.

Key words: production, productivity, information technology, management, productivity measurement, office work.

GUMB 851 **Gummer, Burton, "The Bottom Line -- Current Perspectives on Organizational Productivity and Performance,"** Administration in Social Work. Vol. 9, No. 1, 1985, pp. 93-107.

The ultimate justification of the "organizational society" is a pragmatic one: we must produce in larger quantities, faster and with better quality. Over the past decade, however, there has been growing skepticism about the capacity of bureaucratic organizations to maintain the high levels of productivity and performance necessary to our economic and social systems. Productivity in the United States has, in fact, been falling. The author reports in this article the results of studies that identify the factors associated with organizational performance and the means by which productivity may be improved.

First, the author mentions a study by Marchione and English (1983) which concludes that productivity improvements will only come when managers stop looking at the problem only in terms of negative employee characteristics. Next, he presents the "flexiform" organizational model developed by Mills (1983), which is intended to provide the necessary structures and procedures for maximizing productivity in service organizations. This model is based on the uncertainty (and thus the need for flexibility) in work flow and activities created by the interface between customers and the service organization: the professional who renders the service thus becomes an entrepreneur.

Last, Gummer reports on two studies, one by Parks (1984) and one by Grizzle (1984), dealing with measuring performance of public-sector and service organizations. These studies provide valuable insight into how output measures might be improved. More specifically, the study by Parks addresses the problem of the disparity between subjective and objective performance measures, while Grizzle approaches the issue of organizational performance from the perspective of improving management control systems.

Key words: quality circle, Japan, office automation, productivity, performance, output measurement, public sector.

HACJ 751 **Hackman, J. Richard and Greg R. Oldman.** "Development of the Job Diagnostic Survey," Journal of Applied Psychology, Vol. 60, No. 2, 1975, pp. 159-170.

As both organizational productivity and employee alienation from their work become increasingly problematic in American society, more and more organizations are turning to the redesign of work as a strategy for solving these problems. Hackman and Oldman's article reports on the development of a measurement tool, the Job Diagnostic Survey (JDS) which may be used:

a. to diagnose existing jobs to determine if and how they might be redesigned to improve employee motivation and productivity,

b. to evaluate the effects of job changes on employees.

This instrument is based on a specific theory that positive personal and work outcomes, which include motivation, satisfaction and performance, are obtained when three critical psychological states are present for a given employee:

1. experienced meaningfulness of work,
2. experienced responsibility for outcomes,
3. knowledge of the results of work activities.

As well, these states require the presence of five core job dimensions:

1. skill variety,
2. task identity,
3. task significance,
4. autonomy,
5. feedback.

JDS permits measurement of these dimensions and critical states and of affective reactions to work, as well as the intensity of a person's need to grow in his job. JDS consists of a questionnaire to which employees reply anonymously, using a scale ranging from 1 (low) to 7 (high). Significant values are the average values of groups of persons doing the same work.

A critique of this instrument in an article in EDP Analyzer ("The Challenge of Increased Productivity") claims that organizations are simply comparing the attitudes of their employees with current average attitudes. The reliability and validity of the data presented in this article are based on a study of 658 individuals in 62 different jobs in seven different organizations.

Key words: productivity, measurement, JDS, quality, performance.

HIRL 851 **Hirschorn, Larry and Katherine Farquhar, "Productivity Technology and the Decline of the Autonomous Professional,"** **Office Technology and People**, Vol. 2, No. 4, Dec. 1985, pp. 245-266.

The authors begin their text with the following question: "How can we develop a theory of the productivity of professionals unless we can measure their output?" The discussion of professional productivity is thus based on the problem of measurement. While the productivity of this class of workers is only one dimension of a wider problem and process, mechanisms are needed through which professionals will become more accountable to the organizations in which they work.

Based on these premises, a research project was set up to assess the impact of technology on legal service programs. Using examples, the authors examined three characteristics common to professionals, new technologies and organizational managers. They also identified three key processes which integrate professionals more closely into their work:

1. amplification and rationalization of decision making,
2. vertical and horizontal integration of work,
3. investment in organizational boundaries.

These three processes create five development parameters which, in varying combinations, produce different scenarios of professional work. The authors extracted the following three scenarios:

1. the degradation scenario,
2. the scenario of research and development settings,
3. the mixed scenario in which professionals lose some autonomy but gain in effectiveness and become more responsive.

Such a framework can help assess the impacts of new technologies and enable us to make more informed decisions about their uses.

Key words: productivity, productivity measurement, professionals, impacts, legal services.

HOGP 811 **Hogan, Peter, "Using the Behavioural Sciences to Measure Management Performance,"** Personnel Management (UK), Vol. 13, No. 2, Feb. 1981, pp. 36-39.

The author reviews the use of the behavioral sciences in measuring management performance.

The problem in assessing the performance of the management function lies, in practice, in the improper definition of criteria. Terms such as initiative, integrity, motivation and confidence are often brought up in discussions of managerial performance, but to date these only represent aspects of personality. It is also necessary to measure output, or "how they do their work." The behavioral approach to performance measurement seems to be a viable avenue. It is logical that systematic analysis of work behavior should form the nucleus of any measurement of managerial performance.

The most commonly used technique is the "critical incident" technique. Smith and Kendall have modified this concept and developed a variation. Their approach includes consideration of behavior representative of various performance levels. Employees are asked to select what they feel are the most important qualities or dimensions required for a given job. Scales are developed for each and then the entire process is discussed critically. The calculation may be made more accurate by breaking tasks down using various classifications. For example, in a chemical industry, the following data list was developed to measure performance:

1. initiative,
2. attitude to change,
3. technical orientation,
4. motivation,
5. attitude to corporate policy,
6. relationship with colleagues,
7. technical expertise,
8. routine administration,
9. communication skills
10. problem solving
11. leadership.

Key words: behavioral sciences, managerial performance, critical incident technique, performance measurement.

HUOJ 811 **Huot, Jean-Claude, "Productivity Defined," AACE Transactions, pp. i.4.1 - i.4.7, 1981.**

Over the past 20 years, despite the effects of productivity improvement due to project planning and standardized specifications, and notwithstanding changes in technological characteristics, work productivity has declined steadily in large construction projects. Having described this situation, the author reviews various productivity concepts. Traditionally, productivity is defined as: $\frac{\text{output}}{\text{input}}$ or $\frac{\text{economic value}}{\text{labor cost}}$

In terms of performance, productivity may be expressed as $\frac{\text{BCWP}}{\text{ACWP}}$

where BCWP is "budgeted cost of work performed" and ACWP is "actual cost of work performed". This formula is then amended to obtain project completion productivity: $\frac{\text{BCAC - BCWP}}{\text{FCAC - ACWP}}$

where FCAC is "forecast of cost at completion" and BCAC is "budgeted cost at completion."

Next, Huot makes recommendations for improving productivity in major projects, in such areas as:

1. design,
2. obtaining inputs,
3. carrying out the project.

Productivity in major projects can be controlled if there is good communication and if information is available on work performance. This is achieved by mastering a new integrated concept known as WBS (Work Breakdown Structure). Briefly, WBS involves analysing work by breaking it down into tasks. Productivity in major projects depends on a number of factors:

1. labor resources, which must be organized into teams,
2. the nature of work,
3. repetition of tasks and the attendant responsibilities,
4. logical access and the circulation of information.

Productivity also necessitates adequate construction support and an accurate delivery system. The conditions that must be met for effective implementation of large construction projects are:

1. setting up WBS in a project that is feasible and in line with management intentions and criteria,
2. completing preliminary planning of the work to be done and equipment to be ordered,
3. ensuring that materials are ordered and delivered on time.

Key words: performance, productivity, large construction projects, WBS.

INSN 801 **Institut national de productivité. La problématique de la productivité. -- 1 Le concept de la productivité. Montréal.**

This brochure on the problem of productivity attempts to clarify and define the notion of productivity from an "economic" point of view. Although on the whole it is a good summary, it provides an overly broad view of the concept. According to the authors, the new philosophy of productivity consists of achieving better use of resources at all levels in order to produce the goods and services that are to satisfy the needs of individuals and groups. Since productivity is the ratio of production to resources, it is always expressed in terms of a comparison so as to determine productivity growth and the effectiveness with which material and human resources are being used in production.

Factors of production are the resources used to produce, the main ones being:

1. labor,
2. raw materials,
3. capital,
4. technology,
5. energy.

Productivity improvement factors are grouped into five categories:

1. individual qualities,
2. the choice, utilization and combination of raw materials used,
3. capital utilization,
4. technological progress,
5. government institutions.

At the organization level, the factors of productivity are:

1. operations design and planning,
2. automation of information systems,
3. work organization,
4. production control and equipment maintenance,
5. external factors (subsidies, standards, laws, etc.),
6. marketing.

National productivity is the sum of all productivities, that is, all the value added by all organizations. The productivity figure used is the domestic production per person employed. The drawback of this measure is that it implies that the "productive" manpower of a country or region is the only factor responsible for production. In conclusion, the authors identify the effects of increasing national productivity:

1. better standard of living,
2. decrease in actual prices of some goods,

3. decrease in the work effort needed to procure certain goods,
4. increase in per capita G.D.P.,
5. reduction in work time,
6. layoffs, in certain cases, due to technological change,
7. steady work in some companies which, to achieve maximum productivity, will have to operate full-time.

Key words: productivity, factors of production, factors of improvement, value added.

JACB 811 **Jacobs, Bruce A., "Does Westinghouse have the Productivity Answer?,"** Industry Week, Vol. 208, No. 6, March 23, 1981, pp. 95-98.

Jacobs' article deals with the productivity centre set up by Jerry Hudspeth at Westinghouse Electric Corporation. This centre comprises laboratories, a library, a staff of 250 engineering, robotics, computer and management experts. The purpose of the centre is to find the winning combination of management and technology. Specific objectives are to improve productivity, boost product quality, improve utilization of assets and elevate the quality of working life. When the centre was formed, subcommittees were created to determine programming in light of productivity problems.

The heads of each of the departments involved now report to Hudspeth on the basis of these programs. The purpose of the groups is thus to find solutions that may be applicable to the company as a whole. Five departments are involved:

1. manufacturing technology,
2. systems integration,
3. production methods and measurement,
4. corporate quality,
5. operations analysis.

The article concludes that the centre appears to be effective, since it has enabled Westinghouse to improve productivity by 6.1% annually. These figures should, however, be compared with those of other companies in the same sector.

Key words: Westinghouse, productivity centre, productivity, case study.

JOSJ 841 **Josy, Jerry W., "Maximizing Output: A Multi-faceted Problem,"** **National Underwriter (Life/Health), Vol. 88, No. 38, September 22, 1984, pp. 18-24.**

This article by Jerry W. Josy deals with productivity and its ever-growing popularity. The many studies and reports on the impacts of productivity are indicative of a constant effort to maintain the improvement and to understand this productivity.

In many cases, the solutions to these problems are oriented to measurement tools, promoting specific techniques or approaches for improving organizational productivity. The author proposes a different way of improving productivity. His claims are based on a program developed by the PMIC (Productivity Measurement and Improvement Committee) in connection with an internal research project aimed at formulating a broad concept of productivity improvement. Although the author does not discuss the definition per se, he explains the strategy developed to improve productivity, which involves four elements: a responsibility structure, technical support, evaluation of results and a lump-sum bonus for success. Conditions for achieving real and sustained productivity gains are that:

1. senior management show its support for the improvement program,
2. middle management and employees understand what productivity means and how it can affect them,
3. executives develop new expertise and be ready to assist others,
4. individual responsibilities be clearly identified,
5. current and future productivity programs be logically integrated.

The strategy is defined by a committee which incorporates all these factors.

Key words: productivity, improvement strategy, PMIC.

KAPP 861 **Kapsales, Peter, "Before and After WP: An Office Automation Productivity Study,"** _Journal of Systems Management_, **April 1986, pp. 7-9.**

In this article, the author stresses the fact that potential productivity gains following introduction of word-processing equipment must be large enough to justify the cost involved in such an investment. In Kapsales' view, the purchase of word-processing equipment is justified when:

1. it prevents typists from making unnecessary keystrokes,
2. it speeds up and simplifies document formatting activities,
3. it provides significant benefits by generating personalized letters.

These advantages of word processing did not apply to most of the typing done in the organization. The benefits an organization would receive from word processing were difficult to quantify, but costs were easily identified as:

1. capital expenses,
2. training and start-up expenses,
3. salary expenses,
4. maintenance and supplies.

Many organizations wasted thousands of dollars through unproductive and disorganized word processing operations. Companies should avoid such losses by hiring a consultant to set up policies and procedures and to provide employee training and supervision. The manual environment and the impact word processing will have on it must also be carefully evaluated. After this evaluation is made, a plan for automation can be developed and implemented. According to Kapsales, proper planning provides the organization with productivity improvements that exceed the costs of automation. Organizations can then handle larger volumes of business at lower cost.

Key words: productivity, planning, word processing.

KATB 791 Katugampola, Bernard, "Measurement of Managerial Performance," *CGA Magazine*, Vol. 13, No. 4, 1979, pp. 15-17.

The first person to attempt to measure "a fair day's work" was the American Frederick Taylor, nearly 75 years ago. Nowadays, measurement of the workday has become an increasingly important requirement. Traditionally, work measurement techniques are applied to manual and clerical work, because this type of work is easily measurable. No serious attempt has been made to measure managerial performance, not only because most functions cannot be measured in units of output, but because there is considerable resistance to this.

Measurement implies a base standard or performance norm. There are qualitative and quantitative standards. Quantitative standards are relatively simple to measure and are used for measuring clerical and hourly paid labor. Measuring the effectiveness or the productivity of managers is more an art than a science. Identifying and describing managerial performance standards is a difficult task. The basic problem is that we have no standards for comparison.

The author next attempts to assess or measure performance by taking the example of an accounting firm and using two approaches: by exception and by evaluation.

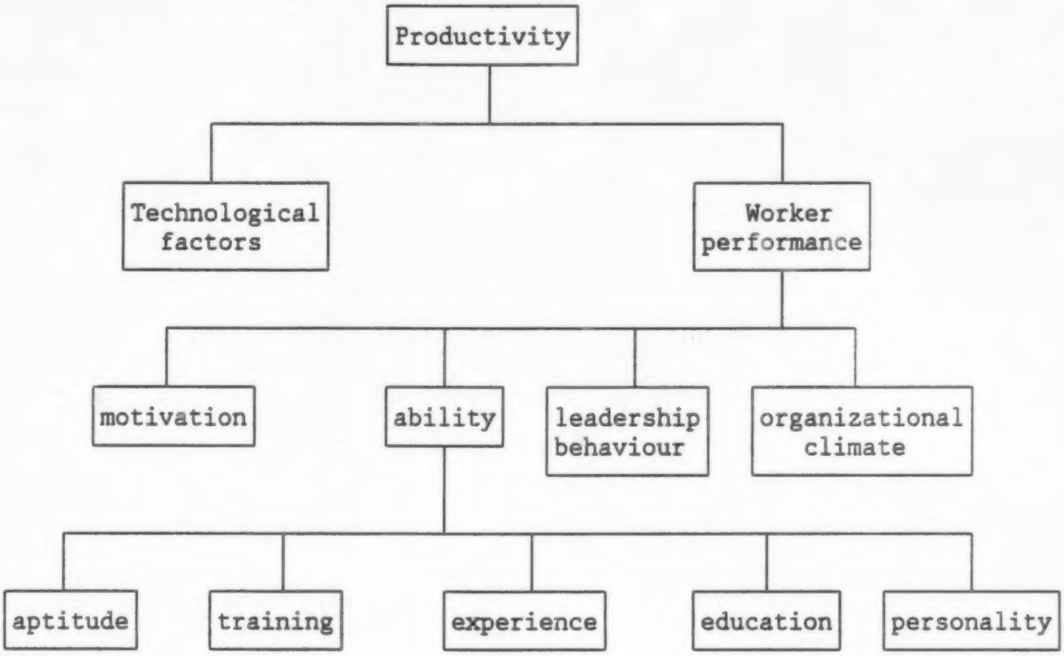
1. *Exception*: Since reaching goals means an improvement in productivity, accomplishments must be compared with these goals. This measure is developed by considering the importance of goals and the skills required to attain them, the extent of dependence on others and the time requirements for each task.
2. *Evaluation*: Katugambola proposes self-logging as a way of measuring performance. The great advantage of this method is its simplicity. Each employee keeps a record of the time spent on each task. At the end of the review period, tasks are summarized by type of function and time required. This time may then be compared with established standards or time spent by other employees on the same tasks.

The methods described are a means of determining managerial performance, leading to efforts to improve productivity.

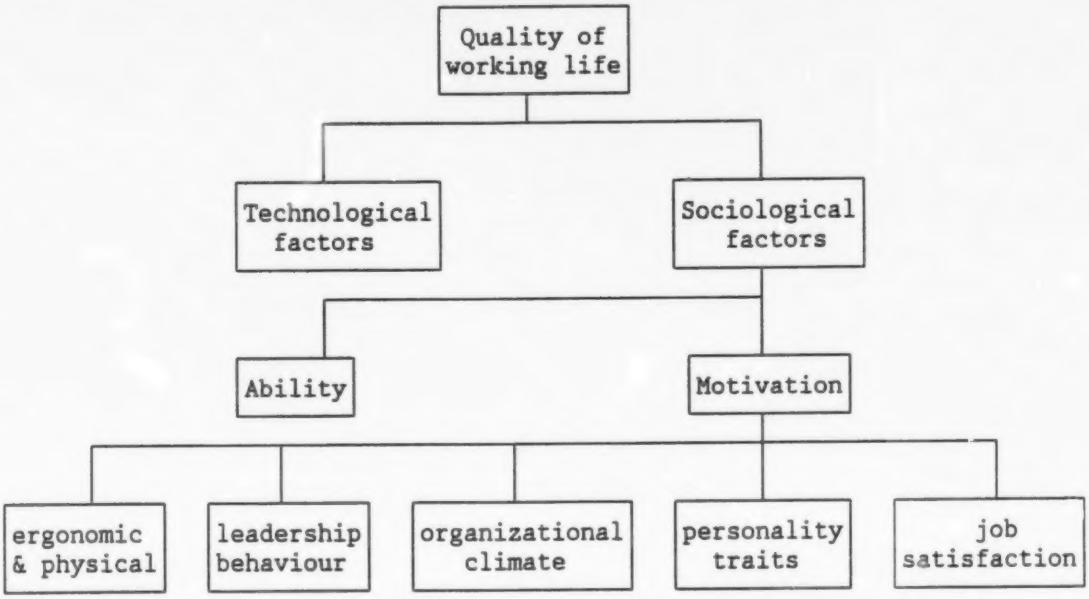
Key words: performance measurement, managerial performance, effectiveness, productivity, performance standards, objectives.

KAYA 851 **Kaye, A.R. and M.J.D. Sutton, "Productivity and Quality of Working Life for Office Principals and the Implications for Office Automation,"** Office Technology and People, No. 2, 1985, pp. 267-286.

It is by now well accepted that Office Automation projects frequently succeed or fail for reasons that are only partly connected with the nature of the technology itself and that behavioral factors play a major role. The purpose of this article is to show the relationship between productivity and quality of working life (QWL), with particular attention to the role played by job satisfaction. The authors first present a productivity model that distinguishes between worker performance and technological tools. Technology is merely a tool or facilitator of performance, albeit a powerful and diversified one.


Productivity
Technological factors
Worker performance
motivation
ability
leadership behaviour
organizational climate
aptitude
training
experience
education
personality

The dominant theme in recent QWL research and theory is that employees' experience of satisfaction or dissatisfaction constitute the QWL of the individual. Kaye and Sutton also present the following model:


Quality of working life
Technological factors
Sociological factors
Ability
Motivation
ergonomic & physical
leadership behaviour
organizational climate
personality traits
job satisfaction

It will be noticed that there are common factors in both the productivity model and the QWL model. Since it is recognized that job satisfaction is a major component of quality of working life, the authors devote an entire section, in addition to a model, to this subject. Although job satisfaction is not seen as a direct contributor to productivity, it does contribute indirectly, since it is a factor in motivation. Productivity and QWL are both crucially dependent on job satisfaction. This contrasts with the commonly held opinion that productivity and QWL in some way conflict.

The authors then give examples of successful and unsuccessful office automation projects which may be directly linked to job satisfaction.

In almost all cases of Office Automation planning, many of the elements of the basic productivity model other than job satisfaction are carefully attended to in the planning process. Especially in recent years, it is more common to find adequate attention being paid to the physical and ergonomic aspects of the workplace. The important choices to be made, according to Kaye and Sutton, lie in the area of management philosophy and objectives. The authors do not give a specific set of guidelines for planning, but recommend use of the job satisfaction model as well as the type of case analysis presented in this article.

Key words: office automation, behavioral factors, quality of working life, productivity model, job satisfaction, motivation.

KENJ 841 Kendrick, John W. Improving Company Productivity: Handbook with Case Studies, in collaboration with the American Productivity Center. Baltimore: The Johns Hopkins University Press, 1984, Chap. 2-3-11.

Chapter 2

This chapter is an introduction to the concept of productivity (ratio of outputs/inputs), which is defined as the quantity of goods and services produced by a firm and which depends on the quantity of labor and other resource outputs used. The chief cause of productivity growth, over the long run, is cost-reducing innovation in the technology and organization of production. Labor is the major factor in determining costs, and output per labor-hour is thus often used as an indicator of change in productivity efficiency. Changes in productivity are due to two causes: 1) fundamental factors, and 2) proximate determinants. Fundamental factors include:

1. rate of technological progress,
2. costs affected by taxes, public spending and other governmental action,
3. other factors that directly affect productivity.

Proximate determinants include:

1. increasing relative efficiency at successive levels of technology,
2. R & D,
3. various problems in measuring productivity (quality measurement),
4. productivity directly affected by use of new or improved producer goods,
5. economies of scale,
6. rate of investment,
7. employee motivation,
8. quality of administration.

Chapter 3

This chapter deals with problems of measurement, which are associated with three factors:

1. statistics,
2. methodology,
3. weighting.

Statistical problems are related to the following points:

1. imprecise data,
2. degree of accuracy difficult to determine,

3 output measurements and certain characteristics of them which may change over time,
4. little control over validity of basic data,
5. variations in input or output may be treated in different ways,
6. statisticians use different conventions.

With regards to methodology, this must be adapted to fit the circumstances, since there is no single method that can be applied to all situations. There is also the problem of weighting to get around: factors must be measured in terms of a base period from which relative prices are chosen for weighting quantities.

Chapter 11

Common mistakes in productivity improvement programs are due to:

1. mandate for improving unsatisfactory productivity is often launched by top management edict,
2. unclear rationale for productivity improvement,
3. top management sabotages program,
4. appointment of incompetent productivity coordinator,
5. failure to consider timeliness or appropriateness of improvement program,
6. responsibilities not clear,
7. fascination with often inadequate technology,
8. inadequate follow-up of programs within the organization.

The second part of the chapter deals with planning a productivity improvement effort. This planning must be seen as a continuous, orderly process. The stages of this process are:

1. awareness/education,
2. strategic planning,
3. assessment of planning strategy,
4. implementation,
5. evaluation and refinement.

A number of key elements are needed to enhance the implementation of a productivity improvement program, the two most important of which are:

1. clearly defining goals and objectives of the program,
2. implementing the program at the opportune moment.

Key words: productivity, innovation, technology, efficiency, proximate determinants, measurement problems, quality, improvement program, APC.

KETW 831 Kettinger, William J., "Models of Office Productivity: What Really Can be Expected?," Papers from the 4th Office Automation Conference, Philadelphia, February 21-23, 1983. American Federation of Information Processing Societies. Office Automation Conference Digest. Washington: AFIPS Press. pp. 31-35.

The first part of Kettinger's article reports the conclusions of a number of American studies. The second describes models of office productivity.

A Computerworld study shows that office automation is seen as focusing on activities that reduce paper flow and manual procedures rather than intellectual work. Other researchers indicate that the clerical work force represents only a fraction of total office labor costs and conclude that for automation to have any major effect on productivity, it must make professionals and managers more productive. The widely quoted Booz Allen study identifies opportunities for raising the productivity of managerial activities. The study also evaluates the benefits accruing from automation. The two other main conclusions are that over $100 billion could be saved by 1985 through use of automated office tools and that 15% of a professional's time could be saved through automation.

Measures of productivity have traditionally focused on manufacturing. In this text, the author deals with productivity in general and orients his study toward white-collar workers. Based on the office as a unit of analysis, measurement is translated into the familiar output/input ratio. The author then examines the time period over which productivity is measured, comparing changes from one period to another.

Using the basic definition, the author notes that there is productivity if:

$$\text{Productivity} = \text{Output}_2 - \text{Output}_1 \text{ greater than } \text{Cost}_2 - \text{Cost}_1$$

Five models are derived from this definition:

1. the optimal model of office productivity: lower costs and greater output,
2. the "worst-case" model: higher costs and decreased output,
3. the cost-reduction model: lower costs and constant output,
4. the value-added model: constant costs and greater output,
5. the marginal-gain model: higher costs and greater increase in output.

By using a number of analysis units (measures of costs, time, output, etc.), the ideal model may be found for a specific organization. The most frequently used model would appear to be the marginal-gain model. Organizations interested in office automation should adopt a well-planned, management approach to achieve even marginal gains.

Key words: productivity, productivity measurement, productivity models.

KISN 861 Kishchuk, Natalie, Pierre Ardouin, Michel Bernier, Amyot Bachand, Michèle Guay, George Wybouw. Evaluating the Productivity Impacts of Office Automation. Laval, Que.: Canadian Workplace Automation Research Centre, 1986.

This document is a paper presented at the 1986 conference of the Canadian Evaluation Society. Given the nature of this event, the authors felt it was important to denounce the use of time and motion measures in assessing the effects of office automation on productivity. The message is clear: it is essential to understand organizational objectives and procedures, to see how the organization defines and measures input and output and also to see what happens in the organization when new office technology is introduced.

The authors question the validity of certain studies which draw conclusions based on inadequate data, as well as the relevance of considering "office automation" as an independent variable.

Key words: productivity measurement, performance.

KLER 851 **Kleim, Ralph L., "Does Automation Necessarily Mean an Increase in Productivity?," Journal of Systems Management, Vol. 36, No. 5, May 1985, pp. 32-34.**

Kleim first mentions the three main reasons which, in his view, motivate automation:

1. automation is seen as a cost-effective way to collect, compile and distribute information,
2. to compensate for rising costs, many managers purchase office systems believing that an increase in productivity will result and that this will offset higher office expenses,
3. to lessen or eliminate unproductive and labor-intensive activities.

No doubt, automation does raise productivity under certain circumstances. Just because an employee uses automated equipment to distribute or produce information does not mean an increase in real productivity. The equipment must be used efficiently. Kleim notes that management should measure productivity in terms of the quality of the material produced, known as actual productivity, and not just on its quantity, known as nominal productivity. What can be done to ensure that implementing office automation results in real productivity? Kleim proposes three criteria to ensure this:

1. management should conduct an analysis before implementation to determine the organization's needs and priorities,
2. management should set up quality control measures to ensure that all documentation produced by the system is relevant, useful and complete,
3. management should prepare personnel for office automation before it is implemented by assisting employees to effectively use the automated system through documentation, satisfying personal requirements and training.

Automation does not guarantee effective productivity gains, but it provides the means for achieving them. Making automation a very productive experience requires management preparation.

Key words: automation, office automation, actual productivity, nominal productivity.

KULD 811 **Kulonda, Dennis J., "Method Measures Productivity in Non-Traditional Work Situations,"** Industrial Engineering, Vol. 13, No. 7, July 1981, pp. 34-37.

This article describes a way of measuring productivity known as WPS (Work Parameter Sampling), which can provide sound results in non-traditional work situations. Work parameters are tasks which determine the work effort for a given job, which will be different in each case. WPS was developed in response to difficulties that arose in measuring the productivity of workers engaged in the preparation of hospital records for microfilming. There are two major sources of variety in these parameters: one is the variety among hospitals, since each hospital has developed its own procedures for record retention. The other is in random fluctuation in the frequency of different tasks occurring in patient folders.

Kulonda then deals with the need for a statistical approach using a program with two distinct phases:

1. an initial statistical study to establish critical work-related parameters,

2. an estimate of the relative frequency of each parameter.

The author first considered using regression, but this resulted in substantial difficulties in application (multicolinearity, etc.). He accordingly opted for MTM (time estimates) instead of regression coefficients. The estimating equation would have the following form:

work content per 1000 records =
$MTM_1\ WP_1 + MTM_2WP_2 + \ldots\ldots\ldots\ldots + MTM_nWP_n$,
where WP_1 .... WP_n are the frequencies for each parameter per 1000 records
and where MTM_1 .... MTM_n are the corresponding time estimates.

It should be noted that, as opposed to the regression method, all parameters must be included in the equation.

In the case studied here, substantial productivity gains resulted from use of WPS. This method is useful in situations where the work to be measured exhibits a lot of unplanned variety or random fluctuation related to parameters of specific products or jobs, in addition to reducing the problem of high variability by aggregating parameters. This approach, which focuses on outputs, should expand the ability to measure and control productivity in applications where variability causes major measurement difficulties.

Key words: WPS (Work Parameter Sampling), productivity measurement, hospital sector.

LUPT 811 Lupton, Tom and Ian Tanner, "Organizational Change for Productivity Improvement," Personnel Review, Vol. 10, No. 4, 1981, pp. 37-40.

The authors identify three main stages in productivity improvement programs. First, defining the units of the organization and the measures to be improved, second, identifying the most critical items, and third, determining the sequence of change in the items to obtain the maximum beneficial effect. A fourth step might be added, that of implementing the changes decided upon.

While explaining the stages of this method, the authors provide several practical examples in connection with each stage.

Although the method appears simple and easy to implement, it deals with two of the most difficult items to identify: defining the types of measures and finding the items that have a direct correlation with productivity.

The authors propose the following participative approach to identifying critical items:

1. every group in the unit involved should be represented,
2. each representative should present a list of what he considers to be critical items,
3. lists should then be compared and discussed to arrive at a comprehensive list.

Each item is then classified in terms of its complexity and equity, then studied and evaluated as to its sensitivity and changeability. These evaluations are then transferred to a sensitivity/changeability matrix. The next step is analysis of the cross-impact matrix to identify the most critical variables for improving productivity.

Key words: productivity, improvement program, cross-impact analysis.

MACS 791 **MacFarlane, Stephen J., "Harris Study on How Offices Work," Office Equipment and Methods, Vol. 25, No. 3, April 1979, pp. 23-24.**

This short article is a summary of the Harris Study entitled The Steelcase National Study of Office Environments: Do They Work?. The study confirms that great changes have taken place in modern offices:

- 73% of office workers have learned new skills in the past five years,
- 72% have had changes in tasks,
- the majority of employees have had changes in location or office,
- nearly half have already begun using a computer during the same five years.

Office workers feel partly responsible for improving output. Harris found that 35% of these people believed that they could do more work, 92% saw a direct relationship between environment and job performance, and 74% felt that they could do more in a day if working conditions and environment were improved. The researchers suggested possible changes and asked employees which would help them accomplish more in the same time period. Over 70% selected "studying exactly what people do on the job and reorganizing what they do so that work flows smoothly from person to person and from department to department." In particular, secretaries ranked cutting down noise and distraction highest, while clerical workers opted for equal sharing in the profits of the company. The biggest obstacles mentioned were too much work to do and lack of time to do it.

Business executives are in favor of changes in office environment for three reasons:

1. expansion of the work force,
2. changes in personnel assignments and departmental relationships,
3. the desire to increase work output of office employees.

The employees who said they were most satisfied gave credit to change in the physical environment (new equipment, repainting, etc.), but also to a more relaxed atmosphere, friendlier people and increased responsibilities. These employees also believed that changes should be planned by a joint committee made up of employees, supervisors and senior executives.

The six elements that office employees consider in a job are: clarity of scope, responsibility, interesting work and access to the tools, equipment and materials needed to get the job done well.

Key words: environment, performance, automated office equipment, reorganization.

MANG 851 **Manoochehri, G.H., "Automation, Job Design and Productivity of High-Volume Office Operations,"** Journal of Systems Management, **October 1985, pp. 14-19.**

Apart from poor management and such things as the energy crisis, one factor that influences the decrease in productivity growth is the change in the nature of our society, from an industrial society to a post-industrial, service or information society, or at least so Manoochehri claims. He also states that, compared to manufacturing, services have lower productivity due to the fact that they are more directly people-intensive. If we wish to increase the rate of economic growth, we have to increase the productivity of services and offices, and this must be done through automation.

The author nevertheless stresses the fact that to increase productivity, an office automation design has to consider the human aspects of work. As well, employee contributions should not be minimized through excessive reliance on division of work and scientific management concepts. In fact, a high degree of division of work and computerization yields simple, repetitive tasks that are highly structured and easily controlled. Such an environment facilitates hiring, training, controlling and firing employees. These conditions promote the attitude of management that employees do not contribute much to the organization.

So management does not have to be concerned with this factor of production and could manipulate it to meet the requirements of other factors and optimize its goals. Such orientations and attitudes cause strong negative reactions in workers that will eventually lead to lower productivity. Office automation managers and designers should reconsider their practices, in the author's view, and recognize the potential benefits of worker involvement in the organization as a whole.

Key words: management, productivity, information, office automation, environment.

MANM 841 **Manheim, Marvin L., "The Impact of Micro-computers on Management Productivity and Organization,"** Logistics and Transportation Review, Vol. 20, No. 4, Dec. 1984, pp. 299-307.

This article describes the possible implications of microcomputers for the transportation field. It is a basic text that is highly descriptive. The author discusses the impact of this new technology on individual and organizational performance.

Using microcomputers, it is possible to:

1. reply more rapidly to questions about problems that need to be solved,
2. analyse more alternatives more quickly and more completely.

The various ways micro-computers can be used are:

1. the office micro: single user, professional or staff,
2. multi-user office micro,
3. at home and for night and weekend use,
4. portable micro for use in the field and while travelling.

The most important element after hardware is software. The author provides some terminology and descriptions of these two elements. The greatest impact of software is through the development of user-friendly programs, which create an impression that computers are easy to use and even appear friendly toward the user. This makes computers:

1. more attractive,
2. stimulating,
3. symbiotic,
4. encouraging,
5. creative.

Key words: microcomputers, performance, software.

MCMT 851 McMahon, J. Timothy. Building Managerial Effectiveness. Work in America Institute Studies in Productivity No. 39, 1985.

This article by J. Timothy McMahon deals with determining managerial effectiveness. The topic of managerial effectiveness has always been an important one, but interest has grown considerably over the past decade. It also appears that the process of improving this effectiveness is a complex one. A great many variables contribute to effectiveness, from personnel selection and models of compensation to organizational policies and procedures. In addition to these situational factors, the effective manager is involved in a great many activities, from exercising leadership and maintaining motivation to solving organizational conflicts and evaluating performance.

Although there is no simple formula for solving this problem, there is some basic information that can be used as a guide to effectiveness. For each of the factors mentioned, there are methods or guidelines that make the manager's task easier. These solutions are found, according to the author, in adopting an appropriate leadership style, setting goals, evaluating performance, managing conflict, managing behavior and modelling (acting as a model for employees).

The manager's world is too complex and changing to accept normative approaches. The order of the day is flexibility. The flexibility needed for managerial effectiveness requires knowledge of the area, diagnostic skill to determine how to behave in a particular situation, and self-control. Improving effectiveness is an ongoing, never-ending process. Managers can continue to acquire new information, apply this knowledge to past situations and gain the understanding necessary to improve in the future. This process requires planning and conscious attention in order to develop managerial effectiveness. Other elements involved in this process are self-control, willingness and time for learning and reflecting.

Key words: managerial effectiveness, review of the literature, leadership, objectives, performance evaluation, organizational conflicts, managing behavior, strategy of flexibility.

MEYN 831 **Meyer, N. Dean, "The Relationship Between Office Automation and Productivity," National Productivity Review, Vol. 2, No. 1, Winter 1982-1983.**

In this column, N. Dean Meyer, an office automation consultant, discusses the relationship between office automation and productivity. His basic perspective is that technology is both subservient and fundamental to productivity.

Office automation tools have direct impacts on productivity measured in terms of managerial and administrative effectiveness. Productivity is the result of an effective synergy between technology and people, but this synergy can only be obtained considering these factors together. In the author's view, there are six basic types of office automation systems:

1. text handling,
2. number handling,
3. graphics,
4. scheduling,
5. telecommunications (teleconferencing and electronic mail),
6. information sources (databases, MIS)

Meyer measures the impact of office automation on organizational effectiveness using the "value-added" concept, although he admits that this involves some problems, which he divides into two aspects: a) value added is more difficult to measure than effectiveness, and b) there is no simple way to predict user needs (in terms of office automation).

Key words: productivity, value added, office automation, impact measurement.

MEYN 852 **Meyer, N. Dean and John C. Bulyk, "Increasing Meeting Effectiveness through Augmented Support,"** Journal of Information Systems Management, Vol. 2, No. 3, Summer 1985, pp. 63-67.

Certain data available would indicate that managers spend 69% of their time in meetings, so improving meeting effectiveness is a challenge most companies cannot afford to ignore. Meetings are thus an excellent target for application of new technologies. Meyer and Bulyk describe automation tools and techniques that facilitate the interpersonal discussions that characterize meetings. Initially, a video projector connected to a micro-computer might be added to the traditional meeting environment. One person (the chauffeur) would take notes and display important points on the screen in order to develop a complete, structured outline of the discussion, which could then be modified.

At the same time, a process analyst, using organizational development techniques, observes group interactions and provides feedback. For optimum success, the analyst, chauffeur and meeting chairperson should meet beforehand to set the objectives of the meeting and develop as clear and precise an agenda as possible.

The impacts of augmented meetings may be divided into five main categories:

1. task orientation: participants concentrate better on the goals and objectives of the meeting,
2. degree of participation,
3. cognitive styles: it is mainly conceptual thinkers who will adapt readily to changes in meetings,
4. the group can work with more information and concepts without being overwhelmed due to the easy access provided by the video projector,
5. conceptual structures: the group can freely structure their thoughts on the video screen.

Meetings that benefit the most from this augmented format are characterized by one or more of the following:

a) they involve participants whose time is expensive and scarce,

b) they concern projects with tight schedules,

c) they are complex because they involve a great quantity of information or address issues that are difficult to analyse.

In the authors' view, meetings need no longer be an expensive waste of time, since augmented meetings facilitate high performance and highly productive teamwork at a reasonable cost.

Key words: effectiveness, augmented meetings.

MEYN 861 **N. Dean Meyer and Associates Inc.** **Annotated Bibliography.** **Ridgefield, Connecticut, February 1986.**

This article is a direct reply to W. Bowen and his article "The Puny Payoff from Office Computers," published in the May 26, 1986, issue of Fortune magazine. N.D. Meyer considers Bowen's article dangerous because it confirms unfounded negative opinions on the benefits of office automation.

Meyer rejects the use of macroeconomic factors to determine whether or not office automation plays a positive role in productivity improvement and gives two reasons:

1. Down escalator effects should not be underestimated: the fact that white-collar productivity has remained constant can be explained by the level of investment in offices.

2. The productivity of the work factor does not allow measurement of gains in efficiency, but rather use of the increased output.

For the author, office automation may increase the productivity of executives and managers. In his book The Information Edge, to be published shortly, Meyer presents over 60 studies of cases where tangible results were achieved. The benefits of office automation are clearly demonstrated in specific applications rather than at the organizational level.

The author concludes by raising questions about evaluation methods, productivity measurement and the good will of executives.

Key words: productivity, down escalator effects, office automation.

MORA 851 Morgan, Allan E. Jr., "Productivity... through Quality," Sky, September 1985, pp. 35-39.

This article deals with productivity improvement through quality. We can be more productive if we succeed in increasing the quality of our product, for example by limiting the number of rejects. In his introduction, Morgan quotes examples where considerable savings were achieved. These are attributed to a training program given by the University of Tennessee. The Institute for Productivity through Quality, affiliated with this university, offers an intensive three-week course on Statistical Process Control (SPC). This course is designed for engineers, supervisors and quality control personnel and is based on statistics and the concepts of tolerance, sampling, variability analysis, confidence intervals, etc. The goals of this course are to learn to understand causes and effects, to solve problems by making adjustments and to establish control systems. The institute's mission is to make the United States more competitive throughout the world and to respond to organizational productivity needs.

For the manager, this means three things:

1. A new managerial climate must be created where production is oriented towards quality.

2. To continue improving and redefining the system, managers must work together and provide employees with training to control quality.

3. Long-term management must take into consideration short-term wishes and their profitability. SPC can produce real gains and results immediately with very little investment.

The most visible benefits defy all financial quantification. Employees are more involved in the production process and thus feel happier and find their work more meaningful. Many of them identify themselves as inventors of solutions, and this strengthens relations between supervisors and employees.

Key words: productivity, quality, training, SPC, investment, benefits.

MOSM 811 Moss, Mitchell L.(ed.). Telecommunications and Productivity, based on the international conference sponsored by the Center of Science and Technology Policy, Graduate School of Public Administration, New York University, January 29-30, 1980. Reading, Mass: Addison-Wesley Publishing Co., Advanced Book Program, 1981. pp. ix-xx.

Recent innovations such as microprocessors, satellites and video technology have expanded our access to and use of information. Although these developments will have consequences for the productivity of individuals and organizations, little is as yet known about the relation between telecommunications systems and government and private productivity. This volume is an attempt to contribute to our understanding of this field.

New communications technologies offer abundant opportunities for improving the performance of social, economic and political systems. A recent development is the introduction of electronic office systems. It is clear that implementation of office automation is not simple, and some worker resistance is encountered. It is therefore strategically necessary to examine organizational and technological factors affecting the design and applications of telecommunications systems.

Current thinking on the use of telecommunications techniques is accentuated by the rising cost of traditional delivery methods and by the decreasing costs associated with new delivery forms; specifically, the former are labor-intensive in nature.

None of the potential benefits of telecommunications are necessarily assured. These benefits depend, in fact, on policies and decisions made by government and industry. Awareness of the options and alternatives in telecommunication systems design has thus become a priority.

The studies included in this volume identify present and future uses of telecommunication systems and their potential impact on productivity in public and private organizations. The focus is on applications of these technologies rather than on the technologies themselves. The book is divided into six parts, the first of which contains articles dealing with the relationships between communications and productivity.

In concluding his introduction, Moss states that telecommunications systems can do much to improve the productivity of employees and organizations. Achieving these objectives depends, however, on the adaptive capacity of our political and economic institutions.

Key words: telecommunications, productivity, impact, potential benefits.

NEWJ 801 **Newman, John E. and John R. Hinrichs, Performance Evaluation for Professional Personnel, Scarsdale, New York: 1980. (Work in America Institute Sutdies in Productivity: Highlights of the Literature; 14).**

Performance evaluation for professional personnel is a process involving:

1. knowing what it is you want professional employees to accomplish for your organization,
2. communicating those performance expectations to them,
3. monitoring, evaluating and modifying performance in order to keep employees on the mutually agreed-upon performance track.

A solid performance evaluation system is at the heart of an effective human-resource management system. This report presents a review of the literature pertaining to the need for techniques for evaluating the performance of professional employees. It is divided into six sections:

1. Defining professional personnel, performance and performance evaluation.
2. The purposes of performance evaluation: there are four main classes of reasons for evaluating professional performance: economic, organizational, personnel and legal. The primary concern is to ensure an organization that its economic and social goals are being accomplished, and second, to aid the organization in accomplishing its goals in a more effective and efficient manner.
3. The goals of performance appraisal for professionals: this evaluation can be the core of management efforts to prevent obsolescence of skills, to assure personal development, etc.
4. The various facets of performance evaluation are: who and what should be evaluated, where and when the evaluation should take place and how it should be performed.
5. Feedback.
6. Ancillary issues, that is, a systems perspective of performance evaluation: a number of factors such as the organizational value system, individual differences and system implementation can significantly affect the success or failure of a performance evaluation system.

Performance evaluation systems are crucial to the effective management of performance in an organization. The approach that will work best for a given organization will depend on the purposes of the performance evaluation system in the organization, the types of performance criteria that can be evaluated, the techniques available for measuring those performance criteria, the nature of the people in the organization and the context in which the organization is operating. The authors also mention conditions that ensure the success of an evaluation program, such as chief executive support. For Newman and Hinrichs, professionals are a vital national resource. It is imperative that their skills be used effectively and efficiently.

The text is followed by abstracts and a bibliography on the subject.

Key words: performance, professionals, review of the literature, performance evaluation.

OSBR 811 **Osborn, Robert W., "Theories of Productivity Analysis," Datamation, Vol. 27, No. 10, September 1981, pp. 212-216.**

The author studies theories of productivity analysis in relation to the data-processing industry.

A number of problems are encountered in measuring the productivity of programmers, such as the quantification and measurement of terms like "capacity," "unit," "effort," and "effectiveness." As well, programmers do not merely produce products (programs), they solve problems encountered by the organization.

In Osborn's view, a productivity measure is ideally a single number, an index, with the following properties:

1. objectively measurable,
2. objectively comparable among companies, divisions, projects and people,
3. comparable over time,
4. distinguish product characteristics from productivity,
5. get larger as things get "better",
6. predict production,
7. use the broadest possible relevant resources,
8. cover both efficiency and effectiveness.

Next, Osborn presents theories for measuring the productivity of programmers, such as measurement by unit output or size of program. These two approaches are not recommended, however, because they do not consider such things as non-program outputs like decision making and the complexity of the project. The author also describes an approach used by the Bank of South Africa, which defines productivity in terms of sub-programs rather than the number of program lines. The cost/benefit analysis deals not with products but with the primary goals of cost savings and profits. As well, the concept of utility may or may not be a part of productivity depending on organizational goals. Cost/benefit analysis encourages programs to increase productivity through careful choice of projects. This measure does not, however, predict production (Criterion 6).

Osborn recommends using the Best Practice Production Function, which is used to formulate indices to compare with each other (for example, the Technical Efficiency Index) and with an optimum. On the practical level, the author uses a linear regression equation.

Key words: indicators, programmers, productivity, productivity measurement, Best Practice Production Function.

OSBW 851 Osborne, Wilma M. and Lynne Rosenthal, "Metrics and Techniques to Measure Microcomputer Productivity," Journal of Research of the National Bureau of Standards, Vol. 90, No. 4, July/August 1985, pp. 305-317.

The authors report that, even though it is commonly agreed that use of micro computers results in increased productivity, little quantifiable data exists to support this idea. It is particularly difficult to measure the work of managers and professionals, since it has no clearly defined inputs and outputs. Consequently, measuring white-collar productivity often depends on the accuracy of perception of the qualitative factors used. It is essential to develop a strategy, and Osborne and Rosenthal propose one, for defining what to measure, when to measure it and how to use the measurement data. The most commonly used techniques are questionnaires and empirical analysis.

Osborne and Rosenthal next describe a method for measuring productivity. The first step is to determine the desired goals and results of the productivity program for a specific environment (the office). The feasibility of the program is assessed, and an appropriate definition of productivity established. Next, this methodology requires defining a set of factors and attributes such as workload and efficiency, along with a procedure for quantifying subjective attributes. It should be noted that productivity should be measured at the individual, departmental and organizational level. The last step is to establish and measure basic activities before and after the introduction of microcomputers.

Next, the authors present the results of organizational experiments in productivity measurement. All organizations reported productivity gains following implementation of microcomputers; however, most conclusions were based on the subjective judgment of managers. According to Osborne and Rosenthal, improvements in productivity and profitability do not come merely from acquiring new technologies. Such results require planning, coordination and the cooperation of all involved.

It is worth noting that this article contains a number of interesting tables, among them a list of factors and attributes used in determining productivity gains, criteria for measuring results, measurement techniques and the steps to be followed in measuring changes in productivity.

Key words: micro-computers, productivity, productivity measurement, method.

OZAT 821 **Ozawa, Terutome**, People and Productivity in Japan, New York; Toronto: Pergamon Press, 1982. (Work in America Institute Studies in Productivity: highlights of the literature; 25).

Japan's manufacturing prowess, achieved through growth in productivity, competitiveness in prices and excellence in quality, has inspired admiration as well as fear in Western countries whose industries are seriously challenged by Japanese competition. As a result, many researchers are trying to understand the secret of Japan's success in the areas of industrial expansion and productivity gains. This article begins with a study of English-language publications and attempts to clarify the question of Japan's success. Ozawa's article is divided into ten sections.

1. Unparalleled productivity growth: the author reports statistics on Japanese productivity and its growth and makes comparisons with other industrialized countries.

2. Sources of productivity: Ozawa mentions macroeconomic and microeconomic sources of productivity. These sources are discussed individually in the following sections.

3. Industrial policy and expansion of aggregate demand: Export expansion had a favorable effect on economies of scale and productivity. Regarding industrial policy, it would seem that the Japanese bureaucracy has guided and fostered a favorable industrial climate.

4. Massive technological borrowing: There is no question that Japan's economic growth as well as its productivity are derived from the use of the latest technologies, which Japan imported on a continuous basis after the World War II.

5. Dual industrial structure: The use of imported technologies meant a new need for capital. How was the capital-poor Japan of the postwar period able to absorb and effectively employ these technologies? Japan purposely maintained and took advantage of the continued existence of a dual industrial structure: a traditional manufacturing sector comprised of relatively small companies and the capital-intensive modern manufacturing structure dominated by large companies owned by industrial groups.

6. Transfer of resources from agriculture to industry.

7. Paternalism and cooperative labor-management relations: Japanese-type management is a significant factor in maintaining a high level of productivity. The "three pillars" of Japanese industrial relations are -- life-time employment, seniority wages and enterprise unions. In addition, Japanese companies look after the welfare of their employees in such areas as housing and medical care.

8. Participatory management: Japanese paternalism is built upon a reciprocal dependence between superiors and subordinates. Japanese management is loosely structured and operates on an informal system of personal relationships through, among other things, quality circles.

9. On-the-job training: this combines occupational training with company-specific training and includes job rotation.

10. Assessment and future prospects: One may wonder whether Japanese industry can continue to enjoy as high a rate of productivity growth, especially in view of new values, such as leisure time, which are taking on more and more importance. The author notes, however, that Japan's employment system has demonstrated, over the past decade, a high degree of flexibility and adaptability toward changes in the social and economic environments.

At the end of this study, Ozawa provides abstracts of articles along with a bibliography.

Key words: productivity, Japan, review of the literature, sources of productivity, paternalism, participation, training.

PASD 851 **Pascot, Daniel, "L'évaluation de la bureautique: une approche constructiviste,"** Optimum, Vol. 16-4, 1985, pp. 42-76.

In this document, Daniel Pascot describes a new approach aimed at designing evaluation protocols that are both specific to each system evaluated and comparable with one another. The author proposes to adopt a constructivist position and use methods developed in the fields of computerization of organizational information systems and artificial intelligence to successfully evaluate the productivity of office systems.

Pascot states that his approach uses the classical definition of productivity as the ratio between the input and output of a system. There are two main phases, the modelling phase intended to produce an evaluation protocol that defines measures and methods of operation (precautions, duration, number of observations, etc.) and the diagnosis and prescription phase. This document concentrates on the first phase, which is broken down into three stages. The first involves developing general knowledge about organizational operations and possibilities for organizational measurement. This development is based on a model of organizational activity derived from a systematic modelling approach Pascot borrowed from work by J. L. Lemoigne (1977). This activity model gives an overall presentation of the variables selected and leads to development of what Pascot calls a conceptual model of overall data. For technical reasons, which he does not explain, the author subsequently refers to this model as the conceptual model of master data, or master data model. This model is completed to serve as a matrix to generate a data collection plan and a database plan to store data on the operation of the system to be evaluated. This model makes it possible to describe an office infrastructure in a satisfactory degree of detail.

The second stage involves structuring of specific knowledge in order to produce a conceptual model of evaluation data representing evaluation indicators. The generation of rules and indicators in the evaluation data model is based on the structure of the conceptual model of master data.

The third and last stage of the modelling phase is fusion of the master data and evaluation models to produce a conceptual model of measurement data. Through the use of a validation process, it uses statistical, measurement and collection techniques to come up with an approach to evaluation.

Key words: office automation, productivity, constructivist approach, evaluation protocol.

PAYB 831 **Payne, Bruce, "Productivity Gains with New Office Technology," The Office, Vol. 98, No. 3, September 1983, pp. 129-148.**

The main concern of this article is with productivity gains through the implementation of new office technology.

The decision to introduce office technology is normally based on cost reduction and/or increased output (quality and quantity). Thus the reason for implementation is usually to improve the present mediocre productivity of the office. The author attributes the current situation to management failure due to inadequacies in:

1. work scheduling,
2. staff training,
3. work methods and procedures,
4. controls for supervision,
5. office layout and design,
6. cost accounting.

Productivity objectives cannot be attained until the organization determines how to measure office work. As a solution, the author uses a method called MTM (Methods Time Measurement). MTM is a technique that provides the capability to measure work accurately and show precisely the best method and procedures to use.

Implementing this method must be done step by step, as follows:

1. set clear objectives,
2. monitor and evaluate performance,
3. evaluate performance in a timely manner,
4. distribute work equitably and reward performance commensurate with standards.

Key words: productivity, MTM, potential benefits, white-collar workers.

PELG 841 **Pellat, Ghislaine, "La productivité administrative:** mythes ou **realités," Brises, No. 5, October 1984, pp. 15-20.**

When investing in office systems, the first objective of organizations of all types is administrative productivity. This type of study is not easy, due to the difficulty of defining and measuring administrative productivity. Specifically, this measurement is laborious in the case of office workers for two main reasons:

1. ignorance of tasks and administrative procedures and of the time involved in carrying them out,

2. the problem of comparing products from the administrative units of different production groups.

Pellat defines productivity as the ratio of the number of items coming out of a production unit to the resources used to produce them. If offices are considered as production units, this definition of productivity may be extended to administrative productivity. The author looks at two approaches to this:

1. holistic approach,

2. observation approach.

Organizations using the first type of approach see their office automation bid in economic terms. Such approaches, for example that implemented by IBM in Europe, tend to provide financial justification for investments rather than to monitor productivity. The second type of approach takes a more microscopic look at the organization. This study, like that of Booz, Allen and Hamilton, begins with an analysis of tasks and different types of employees and a typology of actions to be performed for each job. These latter approaches are, according to Pellat, used in the organizational justification of an investment.

The individual, rather than the office system, is the factor that can increase administrative productivity. Training and information are consequently the main factors influencing this productivity. The success or failure of implementation depends not only on employees, but also on other elements including the architecture of information systems and the procedures and history of the organization.

The study concludes with evidence of the results of investment in office systems, which are positive in 95% of cases, and with the expectations of organizations both public and private with respect to office automation.

Key words: administrative productivity, productivity (definition), productivity measurement, training, information, IBM.

PETA 841 **Peters, Alain, "Office Productivity: Helping People to Keep up with Machines,"** Chief Executive (UK), October 1984.

This short article deals with productivity based on office automation systems. Although advanced office systems can improve productivity and reduce costs, increasing productivity depends on the skills and attitudes of the people using these new systems. According to Bob Bayley, president of IMS (Institute of Management Services), the rapid advance of technological innovation could be slowed by the inability of people and organizations to come to grips with these changes, resulting in an increased requirement for well-trained, recycled workers.

The lack of work measurements and clear objectives may hinder productivity development. Activities and the tasks related to them should be flexible, since they must change with the changing objectives and needs of organizations. It is also important to develop a degree of flexibility in office jobs in order to bring about changes in work groups. Administrative systems analysts are often excluded from the work of setting organizational objectives, thus diminishing the effectiveness of systems. Systems specialists and those familiar with objectives must therefore work together to develop systems for improving office productivity.

Key words: productivity, office systems, objectives.

PREH 731 Productivity: The Personnel Challenge. New Jersey: Prentice-Hall Inc., 1973.

This volume is the final report on a study conducted by Prentice-Hall Inc. on employee productivity. More than ever, companies are discovering that many ways must be found to decrease the time required to perform the workload while maintaining output, quality of goods and services and cost control. This problem, which receives special attention, consists in preparing employees to be more productive.

Executives, like managers, have recognized this new challenge. In many cases, managers have been able to initiate and promote projects related to productivity. These projects involve all the major personnel functions, including recruitment, hiring, duties, personnel development at all levels of the organization and motivating people to do their work better. Management personnel, in addition to all the other responsibilities they have, must exercise constant and innovative leadership.

The Prentice-Hall study describes how managers and senior executives have helped their companies meet productivity-improvement goals. The study is divided into three parts:

Part I: This part concentrates on what personnel can do about productivity. The authors show how management personnel in all types of work situations have implemented productivity programs and had the pleasant surprise of saving money and improving personnel morale. The study also shows how management personnel developed original methods for keeping senior management informed of its efforts and promoted better cooperation among its members.

Part II: How do companies improve productivity? The study reports that the main strengthening factors are measuring employee work output and task enrichment programs. Companies with unions were able to obtain better cooperation from employees on improving productivity and have had these clauses written into their collective agreements. Measurement of work output is thus essential for any company that wishes to determine its level of productivity. But less than half (48.4%) of those who participated in the study had a formal measurement program.

Part III: The last part deals with the communications challenge. What should employees be told? The authors suggest a new approach to informing and involving employees. Case histories show that management can write and speak to employees about productivity without arousing disaffection or antagonism. If clear, honest and comprehensible messages are sent about productivity problems, employees will listen to them. If this objective is attained, employees will recognize the problems. Employee cooperation and participation will then result.

Key words: productivity, personnel management, communications, leadership, case study.

PREW 801 **Presnick, Walter J., "Measuring Managerial Productivity,"** Administrative Management, Vol. 41, No. 5 pp. 26-28, 46-48.

Most administrative managers consider measuring and improving productivity important goals. Stagnating productivity normally means loss of profits, jobs and competitiveness. Many reasons are cited for the decline in productivity. There is, however, one major sector contributing to declining productivity that managers can do something about: exploding costs, related, according to the author, to the work force within office environment.

Historically, much effort has been generated towards improving clerical efficiency via automation. Many managers are just now beginning to realize that the next frontier is the improvement of the productivity of managers and knowledge workers. There a number of reasons for the lack knowledge about these managers' productivity:

1. The inherent resistance to change in the way managers handle information and communicate with others.

2. The lack of information on automated office equipment.

Despite these obstacles, an ever-growing number of organizations, including the following, are tackling the challenge of improving productivity:

1. American Productivity Center, a non-profit, privately funded organization dedicated to strengthening the free enterprise system by developing practical programs to improve productivity and the quality of working life. For example, in 1980 the centre launched a five-year research program entitled IMPRINT (Improvement of Productivity with Information Technology). One of the goals of this project is to test productivity measures already in existence.

2. The National Micrographics Association has adopted the Nominal Group Technique to help identify areas requiring productivity improvement. According to this association, the planning setting of goals is an important part of the managerial productivity process.

3. Office Technology Research Group, an international association of executives from major corporations concerned with the organizational, behavioral and managerial implications of introducing advanced technology into the office. The founder of this group, John J. Connell, believes in establishing a continuing productivity ethic within organization, one that is always seeking out better ways and techniques of operating.

4. The Booz, Allen and Hamilton study, sponsored by major office equipment manufacturers and large user companies to determine the best techniques for getting and distributing information about managers.

Following the implementation of a productivity program, the organization must determine, using a yardstick, whether or not the program has succeeded. At this stage, it is important to first examine quantitative aspects.

Key words: managerial productivity, productivity measurement, knowledge workers, APC, National Micrographics Association, Office Technology Research Group, Booz, Allen and Hamilton.

RHEJ 851 Rhea, Joseph C., "Office Automation: Making People More Productive," Public Personnel Management, Vol. 14, No. 4, Winter 1985, pp. 437-448.

A rather unpretentious article for the uninitiated, which delivered the basic message that was still neccesary to give in 1985!

In this article, the author does not present a solution to problems of productivity, but rather points out that the inappropriate use of automated office systems can have negative consequences that simply multiply problems already present.

Productivity issues are not fundamentally changed by the introduction of office automation. On the contrary, it requires well-trained employees with clear objectives and instructions, the necessary support and sufficient resources to perform the work. For the author, office automation is much more than just word-processing machines.

Case studies are given of two federal agencies. The first focused on office automation as an initiative to improving productivity. The organization had a very limited application for word-processing by a few technical and professional staff.

The second agency sought to automate a new organization by appointing a director with a one-year mandate. There cases illustrate two different approaches: the first attempts to pinpoint some concerns with the perception of office automation, while the second presents a methodology along with several principles for improving productivity using office automation.

The author concludes that improving productivity does not lie in the act of installing automated office equipment: there is the work itself, the social environment, willingness and the commitment of the organization to satisfy employee needs.

Key words: productivity, office automation, information processing, implementation, case study.

RICJ 801 **Richardson, James A., "Organizational Conditions for Improving Human Productivity: Definitions, Diagnosis and Change," Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research APC, April 1980.**

This article deals with the organizational conditions for improving human productivity.

The author suggests that the main effort to change motivation in organizations tends to be non-optimal, nonstrategic and temporary. In an perspective of wanting to develop and maintain a high level of performance in the organization, it is necessary to adopt an overall structural and planning strategy. The conditions in which an overall strategy is implemented must therefore create a motivating environment.

Based on the above, the author developed a model of individual performance improvement. The model is divided into five ranked levels (Level 5, the base, is the "how" level, and Level 1 the "why"). These levels are:

1. main objectives
    - increasing performance
2. major management alternatives
    - direct management intervention
    - technological change
    - employee motivation strategies
    - performance improvement methods
3. key dimensions
    - work climate
    - performance objectives
    - feedback on performance
    - task design
    - organizational design
    - management style
    - value of the organization
4. sub-dimensions
    - abilities
    - task significance
    - task identification
    - autonomy
    - feedback from work
    - feedback from others
5. organizational conditions
    - creation of complete work station
    - results as an end product

Key words: productivity, performance, motivation.

RIGJ 851 Riggs, James L. *The Objective Matrix: a Versatile and Proven Method to Achieve Accountability and Motivation through Productivity Measurement*. Corvallis, Oregon: Oregon Productivity Center, Oregon State University, 1985.

Most workers agree that productivity must be increased; however, it is very difficult to measure productivity. There is employee resistance to measurement; however, there is no way of determining progress without basic data and a measurement system. As well, there is no universally accepted measuring system. Riggs proposes a measurement system known as the objective matrix, based on the matrix format, to improve productivity at the operations level.

Use of the objective matrix produces a productivity index; the process is broken down into stages as follows:

1. The first stage is to determine membership. There is a common denominator for a group since its members share the same identifiable mission within the organization. The group thus formed identifies productivity criteria that apply to their sector of operations. Most of these criteria, which are normally expressed as ratios, involve concepts such as quantity, quality, performance, etc.

2. Group members then develop a measurement scale ranging from 0 to 10 for each criterion, which is then incorporated into the body of the matrix. Three performance levels are defined, with 0 representing the lowest level of performance encountered for a given criterion, and 3 being the current level of performance for the criterion, while level 10 is a realistic goal to be reached by the team.

3. Since all performance criteria do not contribute equally to overall productivity, the organization's managers weight them on the basis of their relative importance to the goals and objectives of the organization.

4. Lastly, the productivity index is calculated by multiplying the result obtained for each criterion by its relative importance and adding together the various products thus obtained.

According to Riggs, the objective matrix technique has a positive effect on employee motivation. The matrix must also be seen in a more comprehensive sense than merely the results of the various criteria. Developing it assists in identifying the organization's goals, assigning priorities, making lists of things to be done and inventorying progress made. Through its flexibility, this technique is applicable both to white-collar and blue-collar workers, and to individual as well as group evaluation. In theory, it is also possible to measure the productivity of each operating unit of an organization in such a way that the weighted sum of the unit measures gives an index of organizational productivity.

Key words: productivity, productivity measurement, objective matrix, motivation, indicators.

ROUJ 841 Roubière, Jean-Jacques, "Contributions à l'approche économique de la bureautique," Brises, No. 5, October 1984, pp. 21-29.

The approaches to economic assessment of office automation and its macroeconomic and microeconomic impacts are many and varied. Roubière attempts to give an overview of these approaches by first adapting the classical theory of transitions, then reviewing several microeconomic measurements.

Classical economic theory deals with the study of economic growth and the structural change it causes. The problem consists in substituting one technique for another. The author explains this model, which includes an equation for transition resulting from fluctuations in employment, and draws conclusions said to be due to the addition of new office automation technology to the economy. In the case of office automation, we must assume the production of information to be final production, that is, similar to the production of consumer goods. We must also assume that operations carried out on an office automation tool are identical to those on a more traditional tool (for example, word processing as opposed to typewriters). Conversely, we must assume the production capacity of an automated tool to be greater. The classical hypotheses are thus respected.

Next, the author studies several microeconomic approaches to the impact of office automation, particularly that of reduction factors. This approach considers the profile of each employee as a vector of time spent on a certain number of operations. If productivity remains the same, the introduction of a new technology will affect working time and thus the profile, thus resulting in the concept of time-reduction factors. Two hypotheses are introduced, with different implications:

1. Productivity should remain the same: by introducing automation, the manager seeks to reduce his overhead.
2. Productivity should increase: implementing office automation leads, among other things, to assignment to new activities. Roubière presents situations resulting from the introduction of automated tools.

In concluding, the author lists other microeconomic approaches, including that of Stabell, whose theory is considered as an extension of the Cobb-Douglas function. Given the diversity of these measures, Roubière suggests developing a model or standards related to tasks and other office activities.

Key words: economic assessment (of office automation), reduction factors, microeconomic approach, macroeconomic approach.

RUCW 821 Ruch, William A. and Judith A. Ruch. White-Collar Productivity, New York; Toronto: Pergamon Press, 1982. (Work in America Institute Studies in Productivity: highlights of the literature; 23).

The problem of declining productivity is one of the most challenging problems facing the U.S. economy today. Most people support the notion that the increasing and diversifying white-collar segment of the work force has created difficulties in defining, measuring and improving productivity. Continued national productivity growth therefore depends upon the ability to meet the challenge of managing resources, particularly human resources, in an economy no longer dominated by output in countable, physical units. Especially in white-collar work, productivity is often confused with efficiency, production, level of activity and effectiveness. The separation of quantity and quality becomes acutely difficult in white-collar jobs. Problems of productivity measurement stem from these fundamental issues of definition. Each of these problems is covered in this text:

1. Definition of white-collar work: the authors distinguish between the broad categories of white-collar workers and the subset of knowledge workers who create, define and develop ideas and those doing skill-related (repetitive) tasks.

2. Definition of productivity: this is the ratio of outputs to inputs. The authors discuss the difficulty of defining white-collar productivity.

3. Measurement and improvement of productivity: measurement of productivity is a prerequisite to improving it. The authors quote articles on productivity measurement, improvement and programs.

In concluding, the authors mention three areas where further research is needed:

1. the need for a definition and a categorization of white-collar workers,

2. the need for better productivity measures,

3. the need for a body of knowledge on the improvement of whitecollar productivity.

It is time to begin systematically and methodologically organizing what is known, developing and discovering what is not known, and applying it to the ever-increasing white-collar segment of the economy.

Following this review of the literature, the authors provide abstracts of articles and a bibliography on the subject.

Key words: productivity, white-collar workers, review of the literature, productivity (definition), productivity measurement, measurement problems.

SCHF 852 **Schneider, M. Franz, "The Relationship between Ergonomics and Office Productivity," Papers from the 4th Office Automation Conference, Atlanta, February 4-6, 1985. American Federation of Information Processing Societies (AFIPS). Office Automation Conference Digest. Washington: AFIPS Press, pp. 123-127.**

The purpose of this article is to demonstrate that the ergonomic environment of the office may significantly increase employee productivity and thus bring managers a substantial return on investment. The author first lists three concerns that must be taken into account when designing and purchasing automated office equipment:

1. expectations of better employee performance,
2. consideration of employee well-being,
3. existence of legislation governing equipment.

Next, Schneider discusses a study conducted by his company on the relation between the ergonomic office environment and productivity. Of a sampling of 4,000 workers, 123 were chosen for a more detailed examination of this relationship. During the eight months leading up to changes in office furniture and the six months following, various performance measurements were taken (scheduling, absenteeism, average time to perform certain tasks, etc.). The results, according to the author, were impressive. For example, the percentage of time spent using a computer rose from 60 to 80%, and discomfort and absenteeism diminished.

Schneider notes that many productivity improvements reported in other studies are criticized as being simply an indication of more attention being paid to workers, but this does not seem to be the case in his study (absence of external effects). Moreover, using certain hypotheses, it can be shown that the costs associated with a new work environment can be recovered in less than a year and that, if improved employee productivity is taken into account, the result is a 40% return on investment. The direct ergonomic impact due to a better environment is thus quite respectable, and can also contribute to improving quality of working life and employee morale, as well as reducing absenteeism and personnel turnover. Ergonomics are not a panacea, however, and cannot replace inadequate administration, poor training or bad organizational planning. Ergonomics can lead to effective management, though, and enable employees to perform at their best.

Key words: ergonomics, productivity, performance, automated office equipment, quality of working life, performance measurement, impacts.

SHEH 841 **Sherman, H. David, "Improving the Productivity of Service Business," Sloan Management Review, Vol. 25, No. 3, Spring 1984, pp. 11-23.**

Although the need for managerial methods of increasing productivity in the service industry is apparent, Sherman notes that few techniques have as yet been developed. Generally, service organizations have not developed standard cost estimates for outputs. One reason for this is that it is difficult to identify the specific resources required to provide a specific service output.

Profitability, return on investment and other financial ratios are not sufficient to evaluate operating efficiency. Recently, Charmes, Cooper and Rhodes developed a linear programming technique known as Data Envelopment Analysis (DEA), that has the ability to compare the efficiency of similar service organizations by considering their use of inputs to produce outputs. Management can use DEA to identify units that are relatively inefficient and to what extent. It is noteworthy that Sherman feels this technique is highly valid for analysing complex situations, for example, when comparing similar organizations providing a number of services and/or with a number of branches.

Concretely, DEA works by identifying the best practice units of the organizations and by estimating the extent of inefficiency of units considered less efficient. The units judged relatively efficient are assigned an efficiency rate of less than 100% (E = 100%).

Managers normally interpret the results obtained using DEA as follows:

1. Efficient units (E = 100%) are relatively, but not strictly, efficient. Consequently, efforts may be made to improve efficiency in all units.

2. Work is nevertheless initially concentrated on progress in the less efficient units.

Sherman illustrates the use of DEA with examples from the banking and hospital sectors. There are three phases in the application of DEA:

1. Managers should first identify the units to be evaluated.

2. They should then determine the relevant inputs and outputs of the units to be evaluated and measure them.

3. Managers apply DEA to locate inefficiencies, but they must nevertheless find the causes of the inefficiency problem and correct them. DEA does not specify how to remedy a problem.

Sherman reports that DEA is also put to good use in dynamic analyses. Using it over successive periods permits tracking of efficiency in an organization. DEA yields information on inefficiencies that are not obtainable from ratio analysis, and is thus a complement to rather than a substitute for other types of analysis.

Key words: productivity, management, efficiency, DEA (Data Envelopment Analysis), banking sector, hospital sector.

SIEI 801 **Siegel, Irving H.** **Productivity Measurement: an Evolving Art.** **Work in America Institute Studies in Productivity, No. 16, 1980.**

This document is a review of the literature on the art of measuring productivity. The author bases his study on the concepts of input, output, labor and capital.

The classic problems of concept, quantification, weighting, quality adjustment and data supply are still with us. For the author, while improvements are still sought in the measurement of labor input, the frontiers are extended to the measurement of capital and intermediary inputs. Despite the progress in methodology and generation of statistics, experts admit bafflement in attempting to account for the recent slowdown in growth of labor productivity at the national level. However, it would be incorrect to conclude that statistics for productivity suffer uniquely from disabilities; there is a need to develop an adequate methodology for producing direct and indirect measures of productivity. Current productivity measurement tends then to expose a general inadequacy in the nation's base of data. There is discussion of gross national product (GNP) and compilation of data on industrial sectors. These measures are useful and assist in understanding the concept of productivity, but are incomplete.

The sources cited in this review could give valuable guidance to designers of indexes from a macroeconomic point of view. At the microeconomic level, the natural candidates for productivity measurement are managers of organizations. At relatively little cost, companies can help themselves obtain better performance by setting up systems to track their own output per unit of partial or composite input and by interpreting numbers as operational signals.

Key words: productivity, productivity measurement, input, output, labor, capital, literature review.

SIND 841 **Sink, D. Scott, Thomas C. Tuttle and Sandra J. DeVries, "Productivity Measurement and Evaluation: What is Available?," National Productivity Review, Vol. 3, No. 3., Summer 1984, pp. 265-287.**

Most managers confuse productivity and performance. This makes the task of productivity measurement more difficult than necessary. Productivity is a component of performance, not a synonym for it. Performance of an organizational system is composed of at least seven causally related criteria, which the authors define as effectiveness, efficiency, quality, productivity, quality of working life, innovation and profitability/budgetability.

In making a critical assessment of an organization, it is important to determine management thinking regarding three elements:

1. knowing the right things to devote resources toward (effectiveness criterion),
2. knowing how to accomplish those goals and objectives (efficiency, quality and innovation criteria),
3. knowing if and how well we have accomplished those goals and objectives (productivity criterion).

It makes no sense to be efficient and not effective. Similarly, productivity measurement is relevant to setting goals, not the contrary. The authors then identify and explain a number of productivity measurement theories, but feel that the three most interesting approaches are:

1. Multi-factor Productivity Measurement Model (mainly used in the manufacturing sector): this technique is based on the premise that profitability is a function of productivity and price recovery. The data required are periodic data for quantity, price and value of each input and output. Using ratios and indexes, this technique measures productivity change in labor, materials, energy and equipment, as well as the effect each one has on profitability.
2. Normative Performance/Productivity Measurement Methodology (often implemented in organizations employing white-collar workers): incorporates structured group processes to identify appropriate productivity measures. This participative method involves a number of stages, described below.
3. Multi-criteria Performance/Productivity Measurement Technique: assumes the existence of a consensus-generated, prioritized list of heterogeneous productivity/performance measures. The goal is to evaluate performance in an integrated fashion. A common performance scale needs to be developed that converts the diverse measures into some common denominator. This measurement technique may be represented on a graph or a matrix.

Sink, Tuttle and DeVries then go on to the decision process used in selecting appropriate productivity measurement techniques. The authors have developed a classification scheme, or taxonomy, to assist managers in this selection process. Two dimensions form the classification scheme:

1. choice of unit of analysis (individual, department, etc.)

2. measurement scope (per minute, hour, week, etc.)

The manager must also take into account factors termed moderator variables, when making this important decision on productivity measurement techniques.

Key words: productivity, performance, productivity measurement, effectiveness, efficiency, quality, quality of working life.

SMAB 841 Anonymous, "Define, Measure and Improve White-Collar Productivity," Small Business Report, Vol. 9, No. 5, May 1984.

The purpose of this article is to examine white-collar productivity, in particular its definition and measurement. Since productivity is measured using the output/input ratio, the challenge rests in determining what is and should be measured among the various outputs and inputs.

Productivity measurement techniques are of prime importance for managers, professionals and technicians. If productivity is effectively measured, an investment-oriented philosophy can be introduced in the office environment to fuel initiative. It may be possible for management to measure white-collar productivity if realistic work objectives are set that correspond to expectations of performance. The steps in effective measuring are as follows:

1. definition of inputs and outputs,
2. setting standards,
3. simplifying procedures,
4. organizing staff in terms of demand.

Productivity measurement techniques vary with the type of group to be measured. For example, when measuring the productivity of professionals, a performance indicator must be established for each task. The following process, developed by the author, might be used to gauge the effectiveness of professionals:

1. draw up written proposals,
2. establish responsibilities,
3. measure performance by goal achievement.

Key words: productivity measurement, MBO, professionals, technicians, white-collar workers.

STER 771 Stevens, Robert I. and Walter J. Bieber, "Work Measurement Techniques," Journal of Systems Management, Vol. 28, No. 2, February 1977, pp. 15-27.

Although office operations are numerous and diverse in application, they have a common purpose, to produce information to assist management in planning. This article describes some work measurement techniques and the ways in which they may be applied as efficient tools for increasing productivity and use of manpower.

The Work Measurement Technique is a method of establishing an equitable relationship between volume of work and the manpower used to complete the work. This technique may only be applied to departments involved in administrative work (activities of a routine nature).

A pilot program should first be undertaken in one department of the organization. As a first step, all functions and conditions should be determined. The authors then list the various stages and techniques to carry out the survey:

1. drawing up an organization chart,
2. drawing up an activity list,
3. making a task list,
4. making a task tally sheet to record daily volumes of activities and the time spent on each duty on the task list,
5. creating work folders (using information from 4),
6. volume and unit time concepts,
7. short interval scheduling: to take into account data collected in previous stages and assign employees work to be done and the expected completion time,
8. work distribution charts: this record reveals the major activities of a unit and the contribution of each individual to these major activities,
9. from-to procedure: comparison between planned work and work accomplished,
10. work distribution summary: drawing up individual programs for work distribution (using data in 8),

11. labor utilization chart: this is the end product of the survey, and indicates the productivity efficiency of the individual employee and the overall efficiency of the department in attaining organizational objectives,

12. drawing up a flow chart: this stage shows where the bulk of work (procedures, etc.) is being done and allows for a review of activities in order to make improvements.

The next phase, if it occurs, is the installation of the new work procedure. This is just as important as the preceding stages. Stevens and Bieber give no specific advice to managers in this regard, although they recommend that periodic follow-ups should be done on the new procedure.

Key words: method, labor, Work Measurement Technique.

STRP 851 Strassman, Paul, "Information Payoff," Computerworld, February 11, 1985, pp. 15-32.

This article is a good summary of Strassmann's book, for those who are just interested in the gist of the author's (not always) original ideas.

In the first part of the article, the author reflects on the cost/benefit aspect of information technology, which is ever more plentiful and accessible; managers should therefore be able to consider economic objectives rather than the means for getting work done.

The most important considerations at this level are return on investment, efficiency and effectiveness.

The author mentions a number of factors that have led him to conclude that there is no correlation between management productivity and information technology, and thus no link between them. Regarding automation, he observes:

1. computers will not make a bad business good,
2. automation is a great cure, but it is not a panacea,
3. a bad strategic situation cannot be corrected by automating it,
4. automate success, not failure.

These considerations cannot be generalized, since the author uses very general terms; for example, how can we define good or bad business? In terms of profits, mission or strategic planning? In some cases, automation of a bad business (in terms of profit) might provide a way to rationalize some expenses, but positive results cannot be expected in the short term, since automation necessitates investment. The return will only come in the medium or long term.

Strassmann's observations might apply in a specific situation.

After making these observations, the author presents a study he conducted of 40 companies, the primary purpose of which was to validate the value-added concept and test analytical techniques that link management productivity to information technology.

The secondary purpose was to explore whether and how information technology was affected by the strategic position of the business.

Among the major trends observed, the author mentions three:

1. Information technology, as a percentage of management costs, continues to rise.
2. Information technology costs show no correlation with management productivity.
3. Year-to-year increases in information technology expenditures showed improved management productivity if the company's strategic position was superior to begin with.

Key words: productivity, information technology, automation, planning, value added.

SWEJ 781 Sweetland, John. Managerial Productivity. Scarsdale, New York: Work in America Institute, 1978. (Work in America Institute Studies in Productivity: highlights of the literature; 4).

Corporate leaders and management theorists have long wrestled with the challenge posed by worker productivity. They have developed elaborate means of measuring it, they have proposed various theories to explain the factors affecting it and they have established techniques to increase it. Perhaps an even more important question, however, is that of managerial productivity. One would expect to find a close correlation between worker productivity and managerial productivity. Indeed, the latter has often been defined in terms of the former. This article presents a review of the literature pertaining to the measurement, prediction and development of managerial productivity.

The author first presents various methods for evaluating managerial performance. In the same vein, he reports attempts made by some researchers to trace the characteristics of effective leaders. For example, workers seem to prefer consultative leadership rather than directive or participative leadership.

Next, Sweetland deals with the prediction of managerial productivity. For example, by using the assessment centre technique, the managerial potential of individuals can be measured. Briefly, this technique takes multiple measures of a group of individuals. The results obtained will indicate the person with the most potential at the managerial level in the organization.

The third section covers the question of increasing managerial productivity. The methods presented range from management development programs to management by objectives and application of behavioral theories.

Sweetland concludes that measuring productivity is a complex, laborious task. The performance of the management of an organization can be appraised by comparing it with other similar organizations. On an individual basis, managers may be evaluated by comparing their performance with a standard. In order to do this effectively, performance objectives must be operationally defined.

The author then gives abstracts of a number of articles, along with a bibliography.

Key words: managerial productivity, managerial performance, review of the literature, improvement methods, productivity measurement.

TATW 851 **Tate, William C., "Measuring Our Productivity Improvements,"** **Business Quarterly, Vol. 49, No. 4, Winter 1984-85, pp. 87-91.**

This very interesting article by Tate presents a type of productivity improvement measurement. Tate, vice-president of Garrett Manufacturing Limited, bases his article on the example of his own firm. Garrett is a major manufacturer of electronic equipment, mainly for the international aerospace industry. As a high-technology producer, Garrett must obtain the highest possible level of productivity and maintain it constantly so that its products remain competitive on international markets. In 1981, it was decided to improve productivity by establishing formal objectives. These objectives take the form of a target percentage increase in the productivity ratio, for the whole company. This ratio is:

$$\text{Productivity ratio} = \frac{\text{value added (shipments - purchased goods + services)}}{\text{labor + capital + financing costs}}$$

At Garrett, the major factor in any productivity improvement is the role of employees. Under the productivity program, this basic philosophy leads to specific goals:

1. employee involvement with participation and teamwork in all departments and at all levels,

2. continuing effort with growing responsibilities,

3. becoming an integral part of the "corporate culture".

Productivity measurement is part of a comprehensive decision-making process. Productivity committees and subcommittees determine the goals of each department in line with overall company objectives. Each department thus chooses its own objectives. To measure results, each subcommittee chooses its own indicators using three parameters:

1. the data used to measure performance must be readily available or obtainable with a minimum of effort,

2. one indicator must be chosen as the factor having the most influence on the department,

3. the indicator chosen must be subject to major influence or control by the individual department.

Once the various indicators have been proposed, a central productivity committee makes a detailed review of the proposals. The various stages of this process are: submission of proposals, evaluation, choice of the best indicator(s) from each department and weighting of each indicator. It is interesting to note that NGT (Nominal Group Technique) is used for this phase.

The schedule for system assessment is as follows:

1. monthly: calculation of each indicator contained in a simple report which includes a year-to-date average
2. quarterly: reports including a detailed discussion of changes for each department
3. semi-annually: each departmental subcommittee meets with senior management to assess progress in meeting preestablished objectives and adjusting these objectives if necessary
4. annually: review of indicators and objectives

This method appears to have generated results, since it has enabled the company, for example, to spark new ideas and obtain significant benefits.

Key words: productivity, productivity ratio, objectives, indicators, NGT, measurement.

TAYJ 751 Taylor, James C., "The Human Side of Work: The Social-Technical Approach to Work System Design," Personnel Review, Vol. 4, No. 3, Summer 1975, pp. 17-22.

The most important aspect of any study of jobs and organizations, in Taylor's view, is the human side of work. The author also maintains that, if work is conscientiously designed as a meaningful activity, the product will be equally satisfactory to its users. In other words, there is a systematic relationship between quality of working life and the quality of the product of this work.

The socio-technical design of work (Socio-technical work system design -- STS) differs from other approaches with regard to matching jobs and employees by paying attention to both technical demands and the psychological and social aspects of individuals and groups. Such an approach results in better product quality and higher productivity.

This analysis begins by defining the boundaries within which the product undergoes change. Insight into employees' perceptions of their work is increased using this flexible and meaningful arrangement of the work itself. Consequently, the focus is shifted to the social organization and control in order to meet technical demands.

Next, Taylor deals with experiments with design teams. Normally, the process begins with a seminar in order to familiarize the team with concepts such as organizational demands, technical requirements, societal factors, etc. The next steps are:

1. exploration: involves comprehensive, far-reaching research on the system to be developed, boundaries, inputs, products, personnel management, environmental relations, etc. This step serves as the basis for defining the initial scope of the system.

2. technical analysis, including:

   a) identification of operating units,

   b) identification of variances: a variance is defined not necessarily as a problem to be solved, but also as a variance from a central trend or standard.

3. Variance-control table: establishes links between technical analysis and analysis of the social system, thus making it possible to introduce purely technical solutions and begin the process of considering social alternatives to direct supervision or coordination.

4. analysis of social system: includes interpersonal interactions in the workplace and examination of roles inside and outside the work system.

5. socio-technical design: once the technical system has been isolated from the social system, the final design process is carried out by rearranging elements in such a way that variances are controlled through full use of the capacity for coordination, now more rapid and flexible, of all elements of the system. The result is a work system where roles (jobs) not only overlap but interact on one another.

The author lists over 100 cases of restructuring of the work system (1975). Almost all of them brought improvements in the level of productivity and quality of working life. Only 9% of cases involved white-collar workers, but Taylor thinks that this percentage will increase in the very near future due to the success of socio-technical design in satisfying both the human and technical demands of work.

Key words: quality of working life, reorganization, STS (Socio-technical approach to work), case study.

TAYJ 821 **Taylor, James C., "Socio-Technical Systems and Productivity," Papers from the 3th Office Automation Conference, San Francisco, April 5-7, 1982. American Federation of Information Processing Societies. Office Automation Conference Digest. Washington: AFIPS Press. pp. 393-398.**

The socio-technical approach to organizational change is based on systematic analysis of technology and human interaction within the organization. Using this approach, managers can first identify the process of change necessary to the technical system, understand it in order derive "normal" output, and then set up a support system based on analyses and including a number of important elements such as maintenance, security, quality of working life, budgeting and long-term planning applicable to the specific situation.

Next, the author gives a brief history of early experiments with socio-technical work systems in the 1950s. During the 1970s, the trend was more to structured analysis and the system-design process, which included the following five stages:

1. analysis of system,
2. analysis of variance control,
3. analysis of central technology,
4. analysis of support systems,
5. design of socio-technical system.

Employee participation in the analysis, design and implementation of socio-technical projects is a recent but important development. There are at least three advantages to this type of participation:

1. decreased employee resistance,
2. stimulation of interest in a new system design to solve problems more effectively,
3. justification of the organizational design allowing it to be understood and shared by a larger segment of the organization.

Most of the experiments with socio-technical work systems in the 1950s, 1960s and 1970s were carried out in sectors mainly employing blue-collar workers. Recent projects have proved that this technique is also effective (with respect to quality, quantity, costs and quality of working life) in administrative units and white-collar departments (word-processing, the banking and insurance sector, etc.). For the author, the next challenge will be that of offices with unspecified functions; for too long, the purpose of such offices has been unclear, resulting in resistance to the use of new work methods.

The advent of low-cost, reliable computers on the office scene has increased the potential for fragmenting jobs and labor relations. Some tools, however, such as electronic mail, will have the reverse effect. Taylor nevertheless states that as long as this breaking down process goes on, productivity will not rise. To solve this problem, the author introduces the idea of promoting office workers to act as coordinators in internal support functions in the workplace.

Office technology is fairly neutral in its application. Differences on the practical level have to do with the question of whether employees are seen as extensions of the machine or vice versa. For Taylor, a participative approach to analysis of socio-technical work systems can ensure that the work of all employees is integrated and focused on a common goal.

Key words: STS (socio-technical system), participation, white-collar workers, office automation.

VICD 851 **Vice, David G., "Productivity and Competition: The Heat's On," Business Quarterly, Vol. 49, No. 4, Winter 1984-85, pp. 53-62.**

The major problem facing Canadian industry, particularly at the industrial level, is whether we are prepared to meet competition. If national productivity performance is taken as an index, we may say that Canada is trailing in this area. To remedy this problem, the author maintains that fundamental, long-term changes are needed in labor and management practices, in legislation and public policy. In Vice's view, an effective program to stimulate productivity should respond to various problem areas through solutions such as:

1. removal of impediments to investment,
2. stronger support for research,
3. reduction of unnecessary constraints on the productivity performance of labor and management,
4. creating a climate conducive to private-sector initiative for increased productivity,
5. restructuring labor-management relations with particular attention to education, the need to increase productivity and cooperation in adapting to technological innovation.

Consequently, unless Canada as a nation can develop a coherent, competitive effort, playing on variables such as costs and quality on local and foreign markets, there will be no revitalization of the Canadian economy. The greatest fear of employees, according to the author, should not be automation, but rather competition. Use of computers in production is the key strategy in reducing costs and increasing productivity. A flexible, automated plant will use computers in almost all aspects of manufacturing: design, planning, control and production. Unfortunately, obstacles such as inadequate financing place limits on such experiments.

We must adapt to new economic realities by modifying organizations, but adaptation is a difficult task. Adapting to change implies the need to rationalize, consolidate, automate, eliminate, reorganize, in other words to re-examine how we do business. Moreover, our competitive ability is intimately linked to our ability to innovate, adapt and initiate change, and all this is a question of education. For Vice, there is an urgent need for Canada to develop a national, coherent, uniform policy on education in order to meet the needs of the new era. The message of this article is that Canadian prosperity is threatened unless we can react promptly by increasing our productivity and competitiveness.

Key words: Canadian industry, productivity, competition.

WAGB 741 **Wagman, B.L., "An Approach to Measuring the Productivity of Staff Functions,"** Public Personnel Management, Vol. 3, No. 5, Sept./Oct. 1974, pp. 425-430.

This early article (1974) provides a very good definition of the normative approach. It is based on a special project conducted by the author, the purpose of which was to develop a reliable, valid measure for evaluating departmental performance. Productivity measurement includes a program evaluation, that is, a comparison of objectives with achievements. The first phase of productivity measurement is thus the development of objectives for the functions being evaluated. In each department, objectives must be structured and established for each major function in order to evaluate the overall performance of the staff manager. Each time an objective is approved, a measure must be developed and a technique established. One simple measure is used, that of performance standards.

The real test of personnel policies and procedures is the end product. Measurement of performance should be in terms of benefits and not in terms of transactions. Wagman defines measures of inputs as a specific "achievement" measure associated with specific objectives. Using the concepts of effectiveness and efficiency, the author introduces the notion of quality (product or service) and notes the products of different quality levels should be treated as separate outputs. Input measures reflect the resources consumed in the production of output. Wagman recommends measuring only hours paid and fringe benefits in terms of current dollars to take into account inflation. He defines productivity as a quotient: aggregated outputs divided by aggregated inputs. Productivity measures may then be converted into indices by expressing them as a percentage of the same quotient for a designated base year, thus permitting comparisons to be made.

Key words: normative approach, performance, productivity measurement, output measurement, input measurement, effectiveness, efficiency, objectives, performance standards.

WEGP 851 Wege II, Peter M., "Productivity: Canada's First Concern," Business Quarterly, Vol. 49, No. 4, Winter 1984-85, pp. 79-82.

A very interesting article dealing with problems of white-collar productivity. Prior to the Second World War, over half the working population was employed in the farming sector. In 1980, Statistics Canada reported that over half the working population was made up of "clerks." Despite this increase, the productivity of white-collar workers has increased only marginally, while that of blue-collar workers has almost doubled. In the author's view, the problem lies in the difficulty of effectively managing white-collar "products."

One solution that might be envisaged for improving productivity would be to develop a productive office environment. Among possible actions towards this goal, the author mentions introducing computers and developing new concepts in office furniture. In addition, Wege notes other factors that influence productivity and that must be borne in mind. These are: air temperature and quality, acoustics, use of color in decorating offices, the need for privacy, and lighting.

Faced with this growing problem, Steelcase Canada Ltd., of which Wege is the president, joined with 600 other companies to participate in a study on white-collar productivity. This study, conducted by the APC (American Productivity Center), found that:

1. Companies that have introduced productivity programs reported average productivity gains of 9.5%.

2. The main reason given for increasing productivity was the desire to improve service or product quality.

3. It takes six months to a year to implement such a program.

4. Productivity gains resulted in:

   - increased work output,
   - error reduction,
   - task difficulty reduction,
   - increased quality of product or service,
   - reduction in response time,
   - better use of space,
   - distraction reduction,
   - improved communications.

Two other studies were carried out in this area in 1978-1980 and these concluded that:

1. 43% of office workers think they could do more in a day if working conditions were improved,

2. 53% of office workers think that an improvement in comfort would improve their productivity,
3. 7 out of 10 believe that good lighting and a comfortable chair would increase their chances of improving productivity.

According to Wege, the reason for automating should always be to increase effectiveness and productivity, with the consequent increase in profitability. In addition, implementation strategies should not be based simply on technology and computers, but also on working conditions, furnishings and people. These strategies are developed at four levels: automation, employee participation, new management and social responsibilities.

Key words: productivity, Steelcase Canada, improvement program, APC.

WEIE 831 Weinberg, Edgar. Labor Management Cooperation for Productivity. New York; Toronto: Pergamon Press, 1983. (Work in America Institute Studies in Productivity: highlights of the literature; 30).

The first section of this study provides a review of the literature. The efficacy of the traditional position on labour-management cooperation has been seriously questioned over the past decade. Weinberg reports that more and more companies and unions are trying new forms of cooperation. Furthermore, a curious rumor is circulating to the effect that employees work better if they are involved in decisions concerning their jobs. A number of problems, such as resistance to change, may nevertheless arise at the time cooperation programs are implemented.

Cooperation between employee unions and management usually involves formation of a joint committee. Such a committee may take the form of a wide variety of arrangements reflecting different purposes and situations in organizations. Each type of committee differs in its agenda, methods of operation and relations to collective bargaining agreements. Weinberg then discusses the following types of cooperation:

1. national collaborative initiatives,
2. industry-wide cooperation: tripartite committee with full government participation,
3. community-wide cooperation,
4. cooperation at the plant level,
5. cooperation in the public sector.

The wide variety of cooperation experiments is, in the author's view, an indication of the extraordinary flexibility of the American system of collective bargaining. The challenge of economic weakness, international competition and the poor improvement in productivity has inspired more interest in and experimentation with productivity programs as well as working conditions. It is not yet known whether these developments correspond to a permanent change in industrial relations.

Weinberg expects that productivity and quality of working life centres and university research centres will contribute significantly to further social progress through their educational efforts.

The author then provides abstracts of articles and a bibliography dealing with cooperation in the workplace.

Key words: literature review, labor-management relations, productivity, quality of working life, cooperation in the workplace.

WERW 861 **Werther, William B. Jr., William Ruch and Lynne McClure.** Productivity through People. **St. Paul: West Publishing Co.,** 1986.

This recent work is based on several assumptions:

1. productivity is crucial to our efficient use of limited resources,
2. people truly are the most important resource in organizations,
3. organizations and individuals can benefit from one another,
4. managers and employees must satisfy each other's needs.

The authors of this work, which runs to over 500 pages, have searched through the literature of various disciplines for the basic organizational factors that have an impact in productivity improvement.

Although all the chapters deal with productivity, Chapter 15, entitled "Productivity Measurement," is of most interest to us. The authors stress the importance of making work behavior coincide with organizational objectives, but note that this work behavior is determined by the manner in which this work is measured (p. 340). They review various definitions of productivity, and look at output from the four aspects of quantity, quality, timeliness and service support after production.

While the principles stated are valid and interesting, the reader will be disappointed to find no explanation of any methods or tools. There is only one reference, which is better than none at all, to an article by Felin and Riggs published in the National Productivity Review (Autumn 1983) on a method using a family of productivity measures.

Key words: productivity, leadership, corporate culture, white-collar workers, productivity measurement.

WYBG 861 **Wybouw, George, and Richard Kanaan. Office Automation and Productivity Measurements: Some Thoughts! Laval, Que.: Canadian Workplace Automation Research Centre, 1986.**

After spending several years examining the impact of office automation, the authors give us their thoughts on productivity measurement. They claim that employment in the service sector might go as high as 80% of total employment by the turn of the century. Productivity gains must therefore be measured in this sector as in the primary and secondary sectors. After defining productivity, the authors identify approaches to measurement based on activities, economic analysis and the Nominal Group Technique. They then review the problems encountered in the evaluation process with respect to the design, definition and application of evaluation measures (individuals, groups or organizations), etc., and conclude that it is vital for the user, like the manufacturer, to find ways of measuring the impact of office automation technology.

This article does not propose solutions, but clearly identifies the problems involved in evaluating office systems.

Key words: office automation, performance, productivity, white-collar workers.

WYBG 871 Wybouw, George, Richard Kanaan, Robert Blake. Office Automation and Productivity: Status Report, Laval, Que.: Canadian Workplace Automation Research Centre, 1987.

The object of this report is manifold. It presents the results of work and reflection by a working group on office automation at the Canadian Workplace Automation Research Centre, which looked particularly at productivity measurement in an automated office environment. The approach was to produce an international bibliography on the subject and make a critical review of the literature in order to create an informal, ad hoc network of some 100 researchers in Canada, the United States and Europe. Also through this reading, plus formal and informal contacts and conferences on the subject, produce a document that attempts, in a rather summary fashion, to determine what productivity is and what are the various approaches and schools of thought connected with it.

It is also intended to provide matter for reflection for managers responsible for introducing electronic office systems into their organizations. Measurement serves to justify a project, justify or render a budget credible at the strategic level, or sell a project by referring to the success of previous projects.

After reviewing various definitions of productivity and related terms, the authors go on to emphasize the differing perceptions of this term held by accountants, managers, engineers, economists and psychologists. Next, they examine the various measurement approaches, concluding that evaluators should be forewarned of the difficulties inherent in measurement in an office environment.

This document should be required reading for any individual interested in developing productivity and performance measurement tools for office automation applications.

Key words: productivity, performance, measurement, office automation tools, white-collar workers.

KEY WORD INDEX

APC

AMEP 821 - BUSI 831 - GREI 811 - KENJ 841 - PREW 801 - WEGP 851

Actual productivity

Productivity in terms of quality of material produced.

KLER 851

Administrative productivity

In the author's view, this is the first goal sought by organizations when investing in office automation.

PELG 841

Attendance

Employee attendance is measured by the number of times an employee is unavailable for work.

FEIE 771

Augmented meeting

MEYN 852

Automated office equipment

MACS 791 - SCHF 852

Automation

KLER 851 - STRP 851

Banking sector

Application of DEA to the banking sector.

SHEH 841

Behavioral characteristics

The author establishes a link between behaviorable characteristics and performance variables (productivity, effectiveness, efficiency) at the organizational level.

GRIW 851

Behavioral factors

Behavioral factors play a major part in the success or failure of office automation projects.

KAYA 851

Behavioral science

"The author reviews the use of the behavioral sciences in measuring management performance."

HOGP 811

Benefits

MORA 851

Best Practice Production Function

The author recommends this technique, which is used to formulate indexes to compare with each other, such as the Technical Efficiency Index, or with the optimum. The purpose of this technique is to measure the productivity of programmers.

OSBR 811

Booz, Allen and Hamilton

CONH 841 - PREW 801

CSS (Common/Comparative Staffing System)(Functional Productivity System)

Measurement system used by IBM in calculating white-collar productivity.

CHAK 841 - GREI 811

Canadian industry

Discussion of a problem facing Canadian industry: competition.

VICD 851

Capital

The author focuses on the concepts of input, output, labor and capital.

SIEI 801

Case study

AMEP 821 - ARDP 861 - BAIM 851 - BUSW 811 - DESG 841 - BIKT 831
DIEG 821 - GRIR 831 - JACB 811 - PREH 731 - RHEJ 851 - TAYJ 751

Chemical industry

Case study dealing with innovations in the chemical industry.

BAIM 851

Communication mode

CULM 831

Communication purposes

1. Information
2. Control
3. Motivation
4. Emotion

CULM 831

Communications

PREH 731

Communications network

COND 721 - CONJ 812

Competition

VICD 851

Competitive strategy

This is one of the six factors which the author maintains can justify changes in the way technology is managed.

CONJ 861

Computer

Measuring the impact of computers on organizational structure.

COND 721

Constructivist approach

The author proposes adoption of a constructivist approach to evaluate the productivity of electronic office systems.

PASD 851

Cooperation in the workplace

- Cooperation between employees, employers, unions, etc.
- The author gives examples of cooperation.

WEIE 831

Corporate culture

WERW 861

Costs related to quality

BAID 821

Criteria for a meaningful measurement system

BAID 821

Critical incident technique

This is a technique for measuring managerial performance.

HOGP 811

Cross-impact analysis

Cross-impact analysis of a sensitivity/changeability matrix to identify the most critical variables for improving productivity.

LUPT 811

DEA (Data Envelopment Analysis)

A linear programming technique that has the ability to compare the efficiency of similar service organizations by considering their use of inputs (resources) to produce many outputs (services).

SHEH 841

Davis Polk & Wardwell

Case study.

BUSW 811

Decision-support system

The author presents seven types of decision-support systems.

ALTS 761

Diebold Group Inc.

DIEG 821

Direction of communication

Vertical or horizontal.

CULM 831

Discretionary time

This is time during which ideas, projects and objectives are created. This article focusses on improving the use of discretionary time.

CONH 841

Down Escalator Factors

Down Escalator Factors may explain the failure of computers to improve productivity. An example given is the concern with minimizing the costs of computerization, particularly in terms of support jobs, considered as non-productive.

Meyer criticizes Bowen's theory of Down Escalator Factors.

BOWW 861 - MEYN 861

EOA (Engineering Operation Analysis)

Productivity-improvement technique.

BRIC 831

Economic assessment (of office automation)

"The approaches to economic assessment of office automation and its macro- and microeconomic impacts are many and varied." The author discusses these approaches.

ROUJ 841

Effectiveness

AMEP 821 - BAIJ 801 - BUSI 831 - GRIW 851 - KATB 791 - MEYN 852
MEYN 861 - SIND 841 - WAGB 741

Effectiveness program

EDPA 811

Efficiency

BAIJ 801 - BUSI 831 - KENJ 841 - SHEH 841 - SIND 841 - WAGB 741

Environment

MACS 791 - MANG 851

Equitable General Insurance Company

Case study.

BUSW 811

Ergonomics

BAIJ 831 - EDPA 811 - GANS 851 - SCHF 851

Evaluation criteria

Criteria for evaluating productivity programs.

BAID 821

Evaluation protocol

The author's approach is to design an evaluation protocol.

PASD 851

Factors of improvement

Productivity improvement factors are grouped into five categories:

1. individual qualities,
2. the choice, utilization and combination of raw materials used,
3. capital utilization,
4. technological progress,
5. government institutions.

At the organization level, the factors of productivity are:

1. operations design and planning,
2. automation of information systems,
3. work organization,
4. production control and equipment maintenance,
5. external factors (subsidies, standards, laws, etc.),
6. marketing.

INSN 801

Factors of production

Factors of production are the resources used to produce, the main ones being:

1. labour,
2. raw materials,
3. capital,
4. technology,
5. energy.

INSN 801

Flexibility

The number of tasks a person knows and can perform.

FEIE 771

Flexibility strategy

"The manager's world is too complex and changing to accept normative approaches. The order of the day is flexibility."

MCMT 851

Hospital sector

This sector is used as an example.

WPS was developed in response to difficulties that arose in measuring the productivity of workers engaged in the preparation of hospital records for microfilming.

Application of DEA to the hospital sector.

CERR 851 - KULD 811 - SHEH 841

IBM (International Business Machines Corporation)

CHAK 841 - GREI 811 - PELG 841

INA Corporation

Case study.

BUSW 811

IOS (integrated office systems)

BAIJ 831

Impact measurement

COND 721 - MEYN 831

Impact of training

BAKD 821

Impacts

Impact of technology in legal service programs.

Impact of implementing office automation.

The studies included in this volume identify present and future uses of telecommunication systems and their potential impact on productivity in public and private organizations.

The purpose of this article is to examine the potential impacts of office automation on organizational communication and subsequently on organizational productivity.

Economic impact due to improved environment (ergonomics).

CULM 831 - GANS 851 - HIRL 851 - MOSM 811 - SCFH 852

Implementation

AIRT 821 - BAIJ 791 - BANN 851 - CERR 851 - GANS 851 - RHEJ 851

Implementation method

CURK 821

Implementation principles

The authors suggest principles for successful implementation.

CULM 831

Implementation strategy

ALTS 761

Improshare (improved productivity through sharing)

A technique (method) for improving productivity.

FORR 851

Improvement measurement

- Of productivity.
- Measuring productivity improvement.

GREI 811 - ATW 851

Improvement method

BANN 851 - SWEJ 781

Improvement opportunities

Opportunities for improving productivity.

BAIJ 801

Improvement program

CAMA 851 - KENJ 841 - LUPT 811 - WEGP 851

Improvement strategy

Strategy for improving productivity

JOSJ 841

Improvement techniques

The author presents five techniques for improving productivity.

FORR 851

Indicators

Creating indicators to measure the productivity of programmers.

Indicators are used to measure productivity.

Discussion of productivity indicators.

Economic indicators.

The author gives a list of productivity indicators.

CONJ 812 - GASD 821 - OSBW 811 - RIGJ 851 - TATW 851

Inefficiency

"Down Escalator Factors may also be explained by what economist H. Leibenstein terms "X-inefficiency," the inefficiency resulting from non-rational use of resources."

BOWW 861

Information

AIRT 821 - BAIM 851 - CONH 841 - CONJ 812 - MANG 851 - PELG 841

Information processing

The author deals with the question of planning information systems through a study of planning and the productivity of users of information systems in large organizations in the Montreal area.

Case study where an agency sought to automate a new organization.

ARDP 861 - BIKT 831 - RHEJ 851

Information system

The most important goal of management, which is productivity, can be pursued through the development, maintenance and conversion of information systems.

Companies that have implemented information systems have increased average productivity by 10.3%.

ALTS 761 - BUSI 831

Information technology

GRUT 851 - STRP 851

Innovation

BAIM 851 - KENJ 841

Input

SIEI 801

Input measurement

CANP 771 - WAGB 741

Interpersonal relations

"Conrath notes that in most cases new communications technology was introduced without considering its impact on the structure of interpersonal (or operational) relations."

COND 721

Investment

MORA 851

Involvement

The author notes that office workers must be involved in all stages of the planning process.

BUSW 811

JDS (Job Diagnostic Survey)

Measurement tool for:

a) diagnosing existing jobs to determine whether and how they might be changed to improve motivation and employee motivation,

b) evaluating the effects of job changes on employees.

EDPA 811 - HACJ 751

Japan

EDPA 811 - GUMB 851 - OZAT 821

Job satisfaction

BIKT 831 - KAY 851

Knowledge work

BRIC 831

Knowledge worker

AIRT 821 - PREW 801

Labor

The author studies the concepts of input, output, labor and capital.

Attempts are made to measure work.

SIEI 801 - STER 771

Labour-management relations

WEIE 831

Large construction projects

The author defines large construction projects and discusses the productivity involved.

HUOJ 811

Leadership

One of the concepts organizations can use as a strategy to increase productivity.

Management personnel, in addition to their other responsibilities, must demonstrate constant, innovative leadership.

The author discusses the importance of leadership style.

The importance of leadership.

BUSW 811 - MCMT 851 - PREH 731 - WERW 861

Legal services

The impact of technology in legal service programs.

HIRL 851

MBO (Management by Objectives)

May be the most commonly used measurement system

"It may be possible for management to measure white-collar productivity if realistic work objectives are set that correspond to expectations of performance."

CONJ 812 - SMAB 841

MIS (Management Information System)

One of the factors justifying changes in the way technology is manager.

CONJ 861

MNI (Mutual Needs Inventory)

Methods for improving productivity.

CONH 841 - FORR 851 - GREI 811

MTM (Methods Time Measurement)

Method used to measure office work.

PAYB 831

Macroeconomic apporach

A type of approach to evaluating the impact of office automation.

ROUJ 841

Management

GRUT 851 - MANG 851 - SHEH 841

Managers

Managerial productivity.

The role of managers in an improvement program.

Managers and quality circles.

CAMA 851 - COLR 841 - SWEJ 781

Managerial effectiveness

MCMT 851

Managerial performance

BAID 821 - CONJ 812 - HOGP 811 - KATB 791 - PREW 801 - SWEJ 781

Managerial productivity

PREW 801 - SWEJ 781

Managing behavior

MCMT 851

Measurement

Measurement of four categories of outcome variables:

1. core task attributes,
2. interpersonal task attributes,
3. affective reactions (satisfaction),
4. productivity.

The author discusses JDS, a measurement tool.

Discussion of various types of measurement.

GRIR 831 - HACJ 751 - WYBG 871

Measurement of coordination

Measurement of project coordination at Hughes Aircraft Co.

BRIC 831

Measurement of knowledge work

BRIC 831

Measurement problems

BAID 821 - GASD 841 - KENJ 841 - RUCW 821

Measurement system

BAID 821

Method

- for measuring work
- for measuring productivity
- for measuring organizational performance
- for mesuring and improving productivity

CONH 841 - DEUS 821 - OSBW 851 - STER 771

Microcomputer

MANM 841 - OSBW 851

Microeconomic approach

Type of approach to evaluating the impact of office automation.

ROUJ 841

Middle management

In relation to quality circles.

COLR 841

Models of office productivity

The author presents five productivity models.

The authors first present a productivity that distinguishes between worker performance and technological tools.

KAYA 851 - KETW 831

Motivation

EDPA 811 - KAYA 851 - RICJ 801 - RIGJ 851

NGT (Nominal Group Technique)

Method for improving productivity.

CONH 841 - FORR 851 - GREI 811 - TATW 851

NMA (National Micrographics Association)

One of the organizations the author claims is tackling the challenge of increasing productivity.

PREW 801

NOSC (Naval Ocean System Centre)

Case study.

BUSW 811

Nominal productivity

Productivity in terms of quantity of material produced.

KLER 851

Normative approach

Measure for evaluating the performance of a department.

WAGB 741

OFA (Operation Function Analysis)

Technique (method) for improving productivity.

BRIC 831 - FORR 851

OPMS (Operational Performance Measurement)

Since 1970, the federal Treasury Board has been conducting a program known as OPMS to measure performance, that is, efficiency, effectiveness, quantity and quality of output and variation in input, in several government departments.

CANP 771

OSC (Office Systems Consulting Methodology)

Productivity improvement method.

BANN 851

Objective matrix

Using the objective matrix to obtain a productivity index

The Oregon Productivity Center (OPC) believes that the objective matrix will make it possible to solve the problem of measuring productivity.

FELG 831 - RIGJ 851

Objectives

FEIE 771 - KATB 791 - MCMT 851 - PETA 841 - TATW 851 - WAGB 741

Office automation

ARDP 851 - ARDP 861 - BAIJ 791 - BAIJ 801 - BANN 851 - CERR 851
CULM 831 - EDPA 811 - FORR 851 - GANS 851 - GUMB 851 - KAYA 851
MANG 851 - MEYN 831 - MEYN 861 - PASD 851 - RHEJ 851 - TAYJ 821
WYBG 861

Office automation tools

WYBG 871

Office management

CONJ 812

Office systems

BIKT 831 - CONH 841 - MEYN 831 - PETA 841

Office Technology Research Group

One of the organizations the author claims is tackling the challenge of increasing productivity.

PREW 801

Office work

To explain the nature of office work, the author distinguishes between the concepts of procedural and non-procedural work and their relevance to the vertical hierarchy of the office.

GRUT 851

Organizational adjustment

Adjustment made necessary by quality circles.

COLR 841

Organizational change

BANN 851

Organizational conflicts

The manager's role in conflicts.

MCMT 851

Organizational performance

DESG 841 - DEUS 821 - GRIW 851

Organizational science

"Griffin notes that the idea that the social environment can influence employee perceptions, attitudes and behaviours is a central element in organizational science."

GRIR 831

Organizational structure

An organizational structure is described as a set of relationships between people who are members of the organization.

These variables should be considered in order to understand how office automation can increase information-processing capacity.

COND 721 - CULM 831

Output

CANP 771 - FUHJ 851 - SIEI 801

Output measurement

CANP 771 - GUMB 851 - WAGB 741

PEM (Performance Evaluation Matrix)

PEM is a method that uses performance evaluation as a tool to improve knowledge worker productivity by having the workers themselves establish objectives.

GREI 811

PMIC (Productivity Measurement and Improvement Committee)

The author's claims are based on a program developed by the PMIC (Productivity Measurement and Improvement Committee) in connection with an internal research project aimed at formulating a broad concept of productivity improvement.

JOSJ 841

PMS (Performance Measurement System)

This is a tool developed by IBM for measuring productivity improvement.

GREI 811

Participation

OZAT 821 - TAYJ 821

Paternalism

Type of Japanese management.

OZAT 821

Performance

CONH 841 - GUMB 851 - HACJ 751 - HUOJ 811 - KISN 861 - MACS 791
MANM 841 - NEWJ 801 - RICJ 801 - SCHF 852 - SIND 841 - WAGB 741
WYBG 861 - WYBG 871

Performance assessment

- evaluating managerial performance
- evaluating organizational performance
- evaluating the performance of professionals

BAID 821 - MCMT 851 - NEWJ 801

Performance measures

BIKT 831 - COLR 841 - DESG 841 - DEUS 821 - FEIE 771 - HOGP 811
KATB 791 - SCHF 852

Performance standards

BAID 821 - FEIE 771 - KATB 791 - WAGB 741

Personnel management

PREH 731

Planning

ARDP 861 - KAPP 861 - STRP 851

Potential benefits

The authors deal with the potential benefits of office automation.

- potential benefits of telecommunications
- potential benefits of new technology
- potential benefits of tools to improve productivity.

CULM 831 - MOSM 811 - PAYB 831

Production

The author introduces the notions of economic production and productivity in federal government evaluation.

GRUT 851

Productivity

AIRT 821 - AMEP 821 - ARDP 851 - ARDP 861 - BAID 821 - BAIJ 801
BAIJ 831 - BAIM 851 - BANN 851 - BIKT 831 - BOWW 861 - BRIC 831
BUSI 831 - BUSW 811 - CAMA 851 - CERR 851 - CHAK 841 - COHN 841
CONJ 812 - CONJ 861 - CULM 831 - CURK 821 - DIEG 821 - EDPA 811
FELG 831 - FORR 851 - GASD 821 - GREI 811 - GRIR 831 - GRIW 851
GRUT 851 - GUMB 851 - HACJ 751 - HIRL 851 - HUOJ 811 - INSN 801
JACB 811 - JOSJ 841 - KAPP 861 - KATB 791 - KENJ 841 - MANG 851
MEYN 831 - MEYN 861 - MORA 851 - MOSM 811 - OSBW 811 - OSBW 851
OZAT 821 - PASD 851 - PAYB 831 - PREH 731 - RHEJ 851 - RICJ 801
RIGJ 851 - SCHF 852 - SHEH 841 - SIEI 801 - SIND 841 - STRP 851
TATW 851 - VICD 851 - WEGP 851 - WEIE 831 - WERW 861 - WYBG 861
WYBP 871

Productivity (definition)

FUHJ 851 - GASD 821 - PELG 841 - RUCW 821 - SCHF 851

Productivity centre

Creation of a productivity centre at Westinghouse Electric Corporation

JACB 811

Productivity measurement

ARDP 851 - ARDP 851 - BAIJ 801 - BUSW 811 - CANP 771 - CHAK 841
DIEG 821 - FELG 831 - FUHJ 851 - GASD 821 - GREI 811 - GRUT 851
HIRL 851 - KISN 861 - KULD 811 - OSBW 811 - OSBW 851 - PELG 841
PETA 841 - PREW 801 - RIGJ 851 - RUCW 821 - SIEI 801 - SIND 841
SMAB 841 - SWEJ 781 - WAGB 741 - WERW 861

Productivity ratio

$$\frac{\text{value added (shipments - purchased goods + services)}}{\text{labor + capital + financing costs}}$$

TATW 851

Professionals

Productivity of professionals.

Evaluating professional productivity.

HIRL 851 - NEWJ 801 - SMAB 841

Programmers

An attempt to measure the productivity of programmers.

OSBW 811

Progress

Attempts at and potential for progress.

BAIM 851

Proximate determinants

Causes of productivity change are of two types:

1) fundamental factors,
2) proximate determinants (e.g. motivation, quality of administration, etc.).

KENJ 841

Public sector

CANP 771 - GASD 821 - GUMB 851

Quality

BAID 821 - EDPA 811 - FEIE 771 - GRIW 851 - HACJ 751 - KENJ 841
MORA 851 - SIND 841

Quality circles

COLR 841 - GUMB 851

Quality measures

BAID 821

Quality of working life

KAY 851 - SCHF 852 - SIND 841 - TAYJ 751 - WEIE 831

Quality program

BAID 821

Quantity

This is one of the five major factors of operational performance that are measurable and objective.

FEIE 771

Reduction factors

One of the microeconomic approaches to office automation impact observed by the author.

ROUJ 841

Reorganization

Reorganization of work flow between people and departments.

Reorganization taking into consideration the human factor (sociotechnical approach).

MACS 791 - TAYJ 751

Resistance

Employee resistance to change.

BAIJ 791

Results of implementation

The author lists six types of results due to implementation of office automation:

1. procedure substitution,
2. procedure acceleration,
3. temporal results,
4. control results,
5. qualitative results.

BAIJ 791

Return on investment

Case study

DIEG 821

Review of the literature

NEWJ 801 - MCMT 851 - OZAT 821 - RUCW 821 - SIEI 801 - SWEJ 781
WEIE 831

SPC (Statistical Process Control)

This is an intensive three-week course on SPC. The goals of this course are to learn to understand causes and effects, to solve problems by making adjustments and to establish control systems.

MORA 851

STS (Socio-Technical Systems)

This approach would make it possible to attain the goal of increasing productivity.

The socio-technical approach to organizational change is based on systematic analysis of technology and human interaction within the organization.

TAYJ 751 - TAYJ 821

Service sector

Productivity in the service sector.

FUHJ 851

Software

The greatest impact of software is through the development of userfriendly programs.

MANM 841

Sources of productivity

Ozawa mentions macroeconomic and microeconomic sources of productivity.

OZAT 821

Steelcase Inc.

Steelcase Canada Ltd., of which Wege is the president, joined with 600 other companies in participating in a study on white-collar productivity.

The history of Steelcase Inc.

AMEP 821 - WEGP 851

Supervision

The results of his experiment indicate that objective task changes and supervisory cues influence core task attributes, interpersonal attributes and affective reactions.

GRIR 831

System integration

Skillful integration of different technologies leads to significant productivity gains.

BUSW 811

Systematic approach

To evaluate training.

BAKD 821

Tasks

In this article, employee perceptions and reactions to work are studied through the effects of objective task changes and informational cues from supervisors.

GRIR 831

Technical personnel

COLR 841

Technicians

Productivity measurement techniques are of prime importance for managers, professionals and technicians.

SMAB 841

Technological potential

One of the six factors justifying changes in the way technology is managed.

CONJ 861

Technology

AIRT 821 - BUSW 811 - CURK 821 - EDPA 811 - KENJ 841

Telecommunications

The relation between telecommunication systems and productivity.

MOSM 811

Textile industry

Case study dealing with innovations in the textile industry.

BAIM 851

"Top-down" approach

CAMA 851

Training

BUSW 811 - BAKD 821 - MORA 851 - OZAT 821 - PELG 841

Training objectives

BAKD 821

Type of communication

Synchronous or asynchronous communication.

CULM 831

User

One of six factors which, according to the author, justify changes in the way technology is administered.

CONJ 861

Value added

National productivity is the sum of all productivities, i.e., all the value added by all organizations.

The author presents a study he conducted of forty companies, the primary purpose of which was to validate the value-added concept.

Meyer measures the impact of office automation on organizational effectiveness using the "value-added" concept.

Using the value-added concept, standards can be drawn up for measuring productivity.

When developing productivity indexes, the concept of "value added" is used as a basis for forming an output index.

CANP 771 - DIEG 821 - INSN 801 - MEYN 831 - STRP 851

WBS (Work Breakdown Structure)

WBS consists in analysing work by breaking it down into tasks.

HUOJ 811

WPS (Work Parameter Sampling)

One way of measuring productivity.

KULD 811

Westinghouse Electric Corporation

Case study.

BUSW 811 - JACB 811

White-collar worker

AIRT 821 - AMEP 821 - BIKT 831 - BUSI 831 - BUSW 811 - DIEG 821
CHAK 841 - CONJ 861 - FORR 851 - PAYB 831 - RUCW 821 - SMAB 841
TAYJ 821 - WERW 861 - WYBG 861 - WYBC 871

Word-processing

Implementation of word-processing equipment.

KAPP 861

Work Measurement Technique

This technique is a method of establishing an equitable relationship between volume of work and the manpower used to complete the work.

STER 771